JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

An Appeal.

A FORTNIGHT to-day, the Institution of Gas Engineers commence their sittings under the presidency of Mr. Thomas Glover. With Mr. Glover in the chair, a meeting was held last December in the hall in which the members will assemble, at which it was resolved to form a fund for the perpetuation of the memory of Sir George Livesey, and to apply the fund to the endowment of a Livesey Professorship in Gas Engineering and Fuel. The fund it was proposed should be accumulated to the amount of £10,000. To-day the total of the fund is about £9800—£200 short of the sum required. Is it too much to ask that the deficiency may be made up within the next fortnight, so that the President may have the gratification of reporting at the opening sitting of the Institution that the fund has actually reached the sum required. It ought not to be a difficult thing to do this from the still considerable section of the industry forming the non-subscribers. It is earnestly hoped the effort will be seriously made, and that it will prove successful.

In the annual report of the Council of the Institution, there appears an analysis of the contributors to the fund to the date of the report. It exhibits the largeness of the scope for further contributions. There are no less than 631 members of the Institution who have not contributed. Only 154 gas companies have given anything, though there were at the date of the last Board of Trade returns 491 statutory gas companies in the United Kingdom; and a further surprise is that only 19 of the 272 local authority gas undertakings of the country have subscribed. When these figures are considered, it must be conceded that the members of the British Society of Gas Industries did not do badly with their £538. A year ago Sir George was with us; and on June 16 he read his last paper before the Institution. Its title was "Co-Partnership." We should like our readers, in relation to this fund and the work of the gas industry generally, to consider the title in a much broader sense than the limit imposed upon it for the purpose then in hand by the distinguished author. What we should be pleased to see are the evidences of a greater desire among the responsible heads of gas undertakings to be co-partners in providing the funds for technical work and in sharing in the "profits" of that work.

Institution Annual Report.

IN completed work, there is nothing very solid about the report of the Council of the Institution, as published in other columns. But the Council have kept closely in touch in several directions with some important subjects; and we are hoping that the report Mr. E. W. Smith will be submitting at the annual meeting, upon the investigation into the hygienic and economical applications of gas for heating purposes, and the paper by Mr. Arthur M. Forshaw, the first holder of the Fellowship in Gaseous Fuel at the Leeds University, treating of the results of his work on the relative "mantle" efficiency of carbonic oxide and hydrogen, will put a more conclusive aspect upon some of the special technical work of the year than the report itself presents. However, there must not be disappointment over the poverty of the harvest. The Council cannot perform superhuman feats. There is no surprise, for example, that the Committee on Carbonization are not at present in a position to submit any definite statement on the subject. When the Committee were set their task, the vastness of the problems entrusted to their inquiry caused the suggestion in these columns that the work would necessarily be of a protracted nature. The course of events is justifying the prediction. The times are pregnant with carbonization ideas, trials, and experiences; and never has there been a period in the history of carbonization, having for its primary end the production of gas, in which the whole question, and the considerations affecting it, have been in a more unsettled condition than now. Instead of narrowing down, there is a broadening out, of topic—structural, physical, chemical, and so forth—identified with, or inherent to, carbonization. And there is no immediate prospect of such cessation (as there was, for instance, at the time of the general acceptance of the principles of gaseous firing) that the work of co-ordination and concentration can be taken in hand with any degree of value attaching. When this work is ultimately performed, it should be in a systematic way, and with qualified assistance with time available to devote persistently to the work, instead of the intermittent attention that can possibly only be given by, or expected from, men occupying responsible and time-absorbing positions like the members of the Committee. There is good ground here on which to emphasize the remark of the Council, in a previous paragraph in the report, that increased support should be "given by gas "undertakings to enable the present important investiga- "tions to be continued, and others initiated."

We are glad to see the Council have—following up the criticism by Mr. F. J. Bywater in his paper a twelvemonth ago of the methods of the British fire-clay industry—appointed a Sub-Committee to take part in the work of the Joint Committee consisting of representatives of all the industries interested in the standardization and improvement of refractory materials. Respecting the conference on the international unification of gas-threads, it is a strong case that Mr. Leslie S. Robertson, the Secretary of the Engineering Standards Committee, puts forward against any departure from general practice, unless grave and weighty reasons for such departure can be advanced. The Whitworth forms of thread and pitches have been adopted by the Engineering Standards Committee; and these have been in general use for a considerable number of years throughout not only the British Empire, but also Germany, and many other of the Continental countries. On a consideration of the matter, admittedly only from the case presented in the Council's report, it would appear that confusion and injury—just what it is desired to avoid—would arise, anyway in this country, from the acceptance of the proposals before the International Commission. But there is to be another conference of the members of the Commission this week; so that probably more will be heard of the matter at the forthcoming meeting of the Institution.

Most of the other technical matters treated upon by the Council in the report have recently been before our readers—notably the international unit of light; and the adoption, in concert with the Council of the Society of British Gas Industries, of the model contract clauses. It is observed that the hope is not abandoned by the Council that a conference on the subject of heating by gas may yet be arranged with architects jointly by the Councils of the Institution and the Society of British Gas Industries. There can be no question as to benefit arising from such a course. The Council also briefly report upon the interview a deputation from the Council and the Committee of the Gas Companies' Protection Association had with the Parliamentary Secretary of the Board of Trade on the subject of the general prescription of a standard test-burner for gas undertakings throughout the United Kingdom. The Board have not yet arrived at a decision on the matter; so that the less said at the present time, the better. In conjunction with these miscellaneous matters, there is one other of which mention should be made. Approval will, we are quite certain, be given to the award of the London Gold Medal to Mr. Harold W. Woodall, for the paper he read last year on "Continuous "Carbonization in Vertical Retorts;" of the Institution Silver Medal to Mr. F. J. Bywater, for his "treatise" on "Refractory Material;" and of the Bronze Medal to Mr. A. F. P. Hayman, for his contribution on "Recent Expe- "rience with the Dessau Vertical Retorts." Much original technical work was at the base of these contributions.

Further to Power Competition.

THE competition for power business is becoming more interesting day by day. There is no doubt that steam plant is in these times greatly losing in favour, and the internal combustion engine is gaining much of what the steam-engine is losing. The attention of the gas engineer has during recent years been somewhat constantly directed, by his own immediate surroundings as well as by the technical Press, to the competition of suction-gas plant. It is his business to keep himself well-informed as to the position of not only that but other competitors in the same line. There is another rival of which there has been much talk of late in engineering circles outside the gas industry, and which should be kept well in sight. That is the Diesel oil-engine, which, as a professed competitor of suction-gas and steam plants, is also a competitor of town gas. When it can be claimed, as it is claimed to-day, that there are 350,000-horse power of Diesel oil-engines at work, it would be folly not to recognize that that engine is, within the limits of its application, an effective rival. And just lately there has been a large amount of activity in proclaiming its merits. The Diesel engine is not by any means a new one. The first on this principle was made several years since; but from the very beginning, its efficiency was shown to be in advance of any oil-engine then on the market. The ordinary forms of oil-engine have their defects; their fuel consumption is somewhat high; the labour attaching to them is not a recommendation; foul cylinders and carboning-up are of the common experiences—with the result that they have not commanded any striking adoption such as the gas-engine has achieved, and is still achieving. In the modern Diesel engine, however, there is no question that a departure has been made that should not be ignored. The makers are following hard upon the track of gas-engine makers. The thermo-dynamic efficiency of the engines is spoken of very highly by engineers who have experience of them. They are economical in fuel consumption—the small sizes are reputed to be as economical as the larger ones; and their character for simplicity and reliability are certified by many. The cleanliness of the interior of the engine cylinder and the valves after long periods of running are points of advantage that the older types of oil-engine could not claim; and the cost of repairs is said to be low. With all these virtues, there will be no disposition on the part of town gas men to let the Diesel engines progress without being in a position to show that, when all is said in support of their claims, the gas-engine cannot admit the superiority of the rival.

A paper on the subject has been read before the Institution of Electrical Engineers by Mr. A. J. J. Pfeiffer; the main object of the communication being the advocacy of the use of the Diesel oil-engine in small and medium sized electricity generating-stations in place of other prime movers, and of such use in preference to concentration of generating plant, and the delivery of energy to sub-stations for district distribution. The convictions of electrical engineers are anything but settled on this point as to the relative advantages of concentrated large, and of isolated small, units of plant; but it, and the associated multitude of questions as to capital, running, and management costs, and relative distribution cost and power losses, have little concern for us. The only point at which town gas comes into contact with this question is as to the relative economy to the large electricity consumer for lighting and power of having an independent generating plant of his own, or taking a supply from the district electricity cables. Many gas undertakings have now consumers who employ town gas for operating private generating plants, and who experience both economy and reliability from doing so. And where space and labour, and the minimum scope for trouble and interruption of supply, are matters for consideration—such as in the lighting of large hotels and business establishments—town gas, at moderate prices, is preferred to the suction-gas plant, to the trouble of storing oil, and to the provision for light loads of small oil-engine units to prevent nuisance from smoke. A chairman of a London electric lighting company was only quite recently complaining that certain important consumers had been lost to them, through having installed private generating plants for lighting and power. And breakdowns of electricity supply have, we know, also quite lately produced advantage in the same way for a certain provincial gas undertaking.

However, among oil-engines, it must be admitted that the Diesel is the one that stands at the head and front as a competitor; but, in regard to it, there is still some indefiniteness and unreliability in information in respect of costs. Mr. Pfeiffer gave the capital costs per kilowatt for a steam plant, including buildings, as £24 5s.; for a gas plant, as £23 5s.; and for an oil plant, as £23 to £25. But speakers with experience asserted, in the discussion, that the author had cut his figures much too fine for the Diesel engine; and that the capital outlay for it was high compared with gas or steam. The same applies to the fuel and works costs that he submitted. With a 33 per cent. load factor, the author gave the total works costs for steam as 0·501d. per unit generated, for gas as 0·485d., and for oil as 0·374d. The figure for gas, of course, refers to producer gas; and in working this out, the price of coal was taken at 25s. On this point, the author was closely pressed for taking such a figure for gas—by, particularly, Mr. Leonard Andrews and Mr. J. E. Dowson, both of whom are interested in gas-engine driving by producer and suction gas. Mr. Andrews was emphatic on the point that 12s. per ton was an outside figure to have to pay for coal for gas-producers; but we do not think he would claim that 12s. would be a fair figure to adopt in connection with suction-gas plants. However, taking the 12s., and the 33 per cent. load factor, we get to 0·348d. for gas, as compared with 0·374d. for oil. But in all these comparisons of costs, authors have recourse to such discrepant bases, just as best suits their own individual fancies and objects, that it is difficult to draw reliable conclusions from their figures. We are reminded of Mr. J. F. C. Snell's figures published in the "JOURNAL" on Jan. 28 last year (pp. 215, 218), in which he gave the costs of various forms of power per unit of electricity generated. With a 30 per cent. load, he quoted 0·944d. for coal gas, and 0·812d. for suction gas. But he took the price of coal gas at 2s. per 1000 cubic feet; while many gas undertakings are supplying for power at 1s. 6d., and even lower. The paper is of especial interest in this connection at the present time; for it shows that town gas can, at moderate prices, compete with suction gas for private electricity generation, and offer advantages that are foreign to suction gas. Total works costs, of course, with any form of power, depend greatly upon the loads and the prices of fuel. We do not know the load at the Leatherhead electricity works; but any way Mr. H. W. Handcock shows that, with the Diesel engine, in 1907 the works costs were 1·238d. per unit, and in 1908 0·762d. It will be noted, bearing in mind that the load factor is not stated, that these actual figures are considerably in excess of those quoted by Mr. Pfeiffer.

This brings us to another point. The oil market is a very sensitive one; and the author calculated the price in one place upon the basis of 50s. per ton, and in another of 60s. But the price depends again not only on the market, but the situation of the town; and down south one place at which Diesel engines are used paid 63s. in 1906, 66s. in 1907, and 70s. in 1908. Such fluctuations in the price of the fuel are not commendable features for the oil-engine; and naturally they urge the makers of these engines to extend the sources of fuel as widely as possible. It will interest the gas engineer with carburetted water-gas plant as part of his equipment to learn that Mr. Pfeiffer regards the oil tar from these plants—the oil tar having a calorific value of about 16,500 B.Th.U.—as an admirable oil-engine fuel; and he informs us that it has been successfully used for some time past on the Continent in the Diesel engine. In the carbonization of bituminous coal, a tar oil is also obtained which, on refinement, can be used. In view of the large field of the operations of the gas industry, perhaps it is not a peculiar thing that from it help should be available for so many of its competitors.

However, the main points to be considered are these: The Diesel engine at the present time is an active rival, with qualities that should not be despised. Under normal conditions, there is little to choose between it and the gas-engine in regard to works costs; but the oil market is perpetually in a state of instability as to supply and cost. Capital costs are heavier; and there is the trouble of purchasing and storing the fuel. The Diesel engines, however, demand skilful attention, and more of it, than the gas-engine. There is a certain amount of nuisance with them. Many manufacturers, too, have a great objection to any form of motive power that requires the storage of fuel on their premises, and development *in situ* of the motive force. Gas on tap, for direct delivery to the engine, is a distinctive advantage of which suction gas and the Diesel engine cannot deprive town gas; nor can either of these claim less space,

greater cleanliness, less attention, or a larger degree of constancy, together with the other merits to which Mr. Tookey drew attention in an interesting contribution to our pages last week.

Maladministration in Public Lighting.

THE Public Lighting Question is losing none of its interest; and it is likely to be more with us in the future than in the past. A new phase has just been imparted to it; and the metallic filament lamp is the active cause. The singular thing is that the question has become more acute in certain towns and districts where the electricity supply undertaking is in the hands of the local authority, and the gas supply is controlled by private enterprise—private enterprise, be it marked, in most cases statutorily controlled in a manner that brings advantage to the ratepayers and the consumers with every increment of advantage to those who have provided the capital. In districts where both the gas and the electricity supply are in the hands of the local authority, the question is less acute; and where there is not municipal ownership of either the gas or the electricity undertaking, there the local authorities are only interested in securing the cheapest method of efficient lighting for public purposes. The reason of the greater tension over the matter at the present time where the electricity supply is in the possession of the municipal authority and the gas supply in that of a company, is that the metallic filament lamp is producing an appreciable shrinkage of electricity consumption in private lighting; and, in consequence, the local authorities are rushing precipitately into the adoption of schemes for sacrificing the ratepayers by unnecessary capital expenditure, and putting into the street-lamps, in place of incandescent gas-burners, metallic filaments at almost any price for electricity, in order that the output of electricity shall not show any great declension. These tactics bode no good for the ratepayers. They have to provide sinking fund and interest on the capital expenditure involved; or else pay cash down if the work of conversion is carried out step by step, and *pari passu* payment is made direct from the rates. But whichever way the initial cost is met, the ratepayers have to pay annually more money for a less efficient and less reliable system of illumination, as the people of Hastings, for example, know to their cost. They are made to suffer pecuniarily under the pretext that they are benefiting the electricity undertaking, for the welfare of which they do not individually care one iota, and are unwilling supporters.

The Local Government Board have repeatedly asked, and they are still asking, electricity owning local authorities to try to—in thought, if not actually—divest themselves of their ownership when discussing this question of public lighting, and to treat the matter on an independent business basis, and buy their illumination in the cheapest market consistent with efficiency. But the difficulty is that these local authorities do not care a fig for the Local Government Board. They set at naught the central authority, and treat it as a meddlesome body. The only good the intervention of the Board really does is to call the attention of the ratepayers more emphatically to the reckless procedure of the local authority; but before the local authority will give up their fatuous procedure, they will proceed with their project at a price that cannot possibly pay the electricity department, and that will in all probability result in the necessity for a subvention from the rates. The ratepayers are compelled to support the electricity undertaking, by any unwholesome means the local authority choose to select; and, the more indirect the method, the better the local authority likes it. The Local Government Board and the London County Council have been doing their best to stop the procedure of which we complain, not only by persuasion, but by the former refusing their sanction to loans, and the latter by declining to grant loans. The irritation that these actions have caused in interested municipal circles is indescribable; and the avenue the headstrong municipal councillor has discovered through which to circumvent those who are obstructive to his wishes, is the payment (as already explained) of the cost of the direct conversion of the gas-lamps to metallic filament lamps on the instalment principle. Where there is a will, there is a way. But if the will be irrational, and the way be paved with imprudence, so much the worse for some one or more persons. In this instance, the persons are the ratepayers.

The Hastings Corporation are one of the authorities that have merited reproach from the Local Government Board for proposing an insensate public lighting scheme, which has for its purpose that interesting but vicious operation of robbing Peter to pay Paul. The acts of the Corporation are so vagarious that, setting the one against the other, there are the best of grounds for believing that the robbing of Peter to secure some advantage for Paul will fail in its object. In face of the refusal of the Local Government Board to grant a loan for something that is unproductive of benefit, the Corporation have resolved to begin their project of street-lamp conversion by lightening the pockets of the ratepayers to the extent of £500 the first year; and this is to be spent on the conversion of 130 street incandescent gas-lamps to electric metallic filaments. For this sum, the ratepayers are to gain no advantage in annual cost; and the electricity undertaking will not gain anything, until at some future time, the price for the electricity to these lamps is sufficiently raised, the same as has been the charge for electricity to the public arc lamps. Once the conversion is made, the ratepayers will be in the hands of the Electricity Committee; and the former will have to cry out and wriggle a good many years before they will be able to slip from the leash. The total amount of business that this expenditure of £500 a year is going to produce for the Electricity Department is merely 8 units per hour, at less than 2d. per unit, which is below the total works' cost! The current for the public arc lamps, which is a considerable quantity for all-night lighting, has for some years been charged at 3d. (4·26d. is quoted by the "Electrical Times") per unit; but from July 1 the 3d. is to be increased to 4d. per unit. Yet it is declared that the 2d. per unit will pay for the lighter load—the total of 8 units per hour—for the metallic filament lamps. We cannot find any reasonable explanation for this assertion. Forsooth, there must be people living in Hastings, and among them town councillors, who are easily gulled. We should like to see some answers to the riddle that the Electricity Department have put to the ratepayers, through the credulous councillors, as to why electricity for the fattest part of the public lighting supply must be charged at 4d. per unit, and the leanest part can be supplied at under 2d.? The Electricity Department may rejoice in the possession of supporters on the Council who give them such large-souled support and credence.

As there may be some question as to the 2d. per unit, it should be explained that figures given at a Local Government Board inquiry in November last, at which this question of conversion was dealt with, showed that £3 2s. 2d. per lamp would be made up of current £1 18s. 2d., renewals 13s. 6d., and labour, lighting, cleaning, and extinguishing, 10s. 6d. The Electrical Engineer on the same occasion gave the average consumption of electricity per metallic filament lamp (60 watts per hour) as 245 units per year; so that the £1 18s. 2d. will yield less than 2d. per unit. The Electricity Department says that it will pay, but other public lamps must pay 4d.! To get hold of this metallic filament lighting, it is not improbable that the Electricity Department has included in the 4d. per unit for the arc lamps something to compensate them for the metallic filaments. What they lose on the swings, they gain on the roundabouts. If this is the view they are taking, it is interesting, but it is not straightforward business. We should like to know how many £500 the ratepayers will have to pay in connection with this matter before conversion is ended. Each one of these lamps (and only at best 50 Hefner unit lamps, or less than 50 candle power) the first year, including conversion, is going to cost the Hastings ratepayers about £7! Will the Electricity Department guarantee that the annual charge of £3 2s. 2d. will not be increased? And will the Electricity Department say that the efficiency and reliability (remember recent events) of the street lighting will be on a level with that of the incandescent gas-lamps? Whatever their answers may be, the fact remains that the Corporation are imposing a serious charge upon the ratepayers without any commensurate benefit attaching. There is only one word that fits this sort of thing, and that is maladministration; and maladministration is at the present time a growing evil in more places than Hastings, in connection with the public lighting. In their last report, the Committee of the Gas Companies' Protection Association pointed out that they had had their attention directed to the unfair manner in which this competition with private gas enterprise is being carried on, and they stated that the matter was receiving their close attention. We hope it is. It is one that requires the close attention of as many individuals and organizations as possible.

Science and Industry.

THE meeting of the Institution of Gas Engineers in a fortnight's time, will strikingly illustrate the expansion in the gas industry of the recognition that it is only by the application of science in all the branches of its operations that the utmost progress and advantage will be, or can be, made; and with the completion of the fund that will endow the Chair of Gas Engineering and Fuel at the Leeds University, the bond between science and our particular industry will be made stronger than ever. But the consummation of this scheme, which is sure to have beneficent effect, must not do anything to undermine in the industry individual work in the paths of science that are so profusely opened up in connection with the gas industry. The more minds there are at work, the broader the field of research, and the greater the depths to which investigation is carried, the richer will be the fruits in really useful knowledge gathered from the (at present) vast unknown.

The large affinity that there is between science and industry has been much before us during the past week, through the holding in London of the International Congress of Applied Chemistry, which in itself, in its personal composition—*savants* of all countries being present—was an extraordinary demonstration of the truth, reiterated by the President (Sir William Ramsay), that science is cosmopolitan, and knows no country. Just as it knows no country, so it knows no bounds in industry. We talk of pure science and of applied science, as though there is a severe and quite distinguishable division-line drawn between them. There is not. The one so dovetails into the other that they are really inseparable; and this applies above all things to the science of chemistry. Chemistry is a practical science; and its centres are found in the bed of every industry, however poor or small, however rich or extended. As the Prince of Wales said in opening the Congress, we all recognize that, without a scientific foundation, no permanent superstructure can be reared, and that those great industries which do not keep abreast of the advance of science must surely and rapidly decline. Had the gas industry continued plodding along in the old ways in which crudity was a distinctive feature, the industry would not have been where it is to-day. Look at the heating of our retort-furnaces, at the conditions under which gas is produced, at the incandescent mantle, and at the other means of utilizing gas. Then it must be confessed that we owe much to science for preserving and increasing the strength of our position as one of the great industries of the civilized world.

There is more work to be done. There is more that is useful to be obtained from the coal used; and we want to realize all that is possible—including the bye-products—not in any haphazard manner, but by exact and controllable methods. In such work, and in work dealing with the utilization of the products of manufacture, immeasurable value may be discovered under the auspices of chemistry that will go to increase the industry's wealth. All that is undiscovered represents present waste; all that is saved is an accretion to wealth. But the matter must not be looked at in a selfish manner, as is frequently the case. Science deserves to be rewarded for its fruits. There is too much disinclination to make the reward in a practical manner. Science may be a hard taskmaster in industry if it is ill-directed; but, when properly directed, science and practice operating in company can do an infinity of good in the service of man.

The Shylocks of Salford.

The Salford Corporation are not to be satisfied by anything less than a full pound of flesh from the gas consumers. As the General Purposes Committee, they have held a meeting *in camera* to consider the subject of the limitation to appropriation of gas profits put upon them by the House of Lords; and they have decided to withdraw the gas section of the Bill, which the Lords Committee determined should not be withdrawn unless the whole Bill was sacrificed. According to a notice of the proceedings in a local paper, it was stated that at the meeting the ratepayers had had no opportunity of considering the decision of the Lords Committee. It so happens that Parliament is not in the habit of consulting ratepayers before pronouncing their decisions on a case presented to them. Assent was also given by those present to the suggestion that the Corporation are not prepared to increase the rates by reducing the price of gas, which would necessarily be involved "if they were to comply with the Lords' decision." The Salford Corporation take up an interesting attitude. They consider they are a supreme body—that they have the right to pick and choose from the decisions of Parliament, and to reject all they do not care to accept. While, too, they study the effect of the decision upon the rates, they decline to study the position of the gas consumers, or the question of indirect and unequal taxation. It is a sad blow the House of Lords delivered against municipal trading in general, and the Salford Corporation in particular. What do these sentences in the report mean? "A further point which the discussion centred round was the way the evidence of some of the Corporation witnesses had been given. It was alleged that but for these witnesses the Lords might not have given a decision adverse to the Corporation." We do not know what is intended here; and so leave the point. But what move will the out-district authorities make from whom the Corporation are proposing to take away, without anybody's leave, the success gained in the Lords.

Further Prospectuses.

The East Sussex Gaslight, Coke, and Water Company, Limited, we are inclined to think, have beaten the record now in the matter of issuing prospectuses for a single gas or water undertaking. They are out with a reissue of the one circulated last April, and criticized in the "JOURNAL" for April 27, p. 228. They evidently did not have success with that prospectus, which was fortunate—for the public. The Directors are asking for applications for precisely the same number of shares—483 ordinary ones of £5 each; but the money is now wanted not only for the extension of the works, but for "current expenses." The prospectus has undergone a little further modification. The information about the drainage scheme sanctioned by the Local Government Board is omitted; and the "Important Development: Discovery of Natural Gas" paragraph has become played out. That, too, has been deleted; and its place is now occupied in showing the premiums at which certain Sussex gas and water securities now stand. By an oversight, the East Sussex insecurity has been left out. In a covering letter, "Dear Sir (or Madam)" is reminded that "under this Company's agreements, the period under which this Company's undertaking becomes liable to be purchased, commences to run from February next year; and in the event of the option being exercised, and the business taken over, the shareholders therein would *no doubt* receive a substantial premium." We doubt it. Not long ago the Bucks and Oxon District Gas and Coke Company, Limited, were after fresh capital. They are after more now. On the previous occasion £3500 of 6 per cent. preference stock and £2000 first 5 per cent. debentures were offered. This time the offer is £1450 of mortgage debentures, and £1200 preference stock. Then and now, the money was and is required "in part payment of the purchase money for the Buckingham Gas-Works," and in connection with "the purchase of the freehold works at Woodford." When will these works be finally paid for? A full six months' interest—the old game—is to be paid on Sept. 29 next. When the invitations were last issued, the name of Mr. Alfred Truman, Solicitor, Bicester, Oxon, appeared at the bottom. That of Mr. A. H. Franklin, Solicitor, Oxford, is now given. Has Mr. Truman retired?

Municipal Gas Undertakings Results.

Since referring a fortnight ago to some of the "earlier arrivals" among the results of municipal gas undertaking operations for the past financial year, numerous further particulars have come to hand. There is reported from Evesham a satisfactory increase in the sale of gas; and there is a net profit of over £1600. A point to be noted is that the Gas Committee, finding that during part of the year some people did not use their stoves, but still had to pay hire, recommended that the cost of hiring be reduced 50 per cent. from June 24. At Heywood the net profit is £223, or £1135 less than for the preceding year; this falling off being due principally to bad trade, the increased cost of coal, a reduction in price of gas, and diminished consumption for public lighting. The gas made per ton of coal was 10,859 cubic feet, which was an increase of 89 cubic feet over the previous year. At the same time, the quantity of the unaccounted-for gas was reduced from 7·88 to 6·79 per cent. Heywood has, of course, been

affected largely by the disturbed conditions which prevailed in the cotton trade over a considerable portion of the year; and there has also been a falling off in the prices realized for residuals. Turning to Leeds, we find that, instead of £14,708 being available for the relief of the rates (as was the case twelve months ago), the sum now handed over is £2245. Another place which suffered extensively from the cotton strike is Leigh (Lancs.), where, up to the end of November, there was a substantial decrease in consumption which arose from this cause. Since then, however, there has been an improvement; so that on the year the quantity of gas sent out has increased 0·46 per cent., which, under all the circumstances, is regarded as being very satisfactory. The net amount realized by the gas undertaking is £3238, which has been arrived at after taking from the profit of £3915 a sum of £677 capital expenditure and special charges paid out of revenue. The make of gas per ton was 11,000 cubic feet; and here, again, there is reported a falling off in the value of residuals—with the exception of coke. At Smethwick, there is a loss in revenue from the sale of gas amounting to £1872, of which a reduction in price to large consumers accounts for a little more than half—the remainder being due to diminished sales. The falling off is explained by bad trade, exceptionally light days, and the introduction of suction gas and electric installations by some of the large consumers. The net profit is £7445, against £10,021 last year. Coal cost nearly 6d. per ton more. From the net profit named has to be deducted the value of public lighting, £3934, "now contributed free of charge by the Gas Committee in aid of the district rate." The net profit for the year at West Bromwich is £3317, compared with £4114 for the previous year. During the financial period just closed, nearly all branches of trade and industry in the borough suffered from somewhat serious depression; and while a considerable increase in the number of consumers took place during the year, there was a drop of about £1500 in the receipts from sales of gas. The yield of coal gas was 11,141 cubic feet per ton carbonized; while the yield of water gas was 53,300 cubic feet per ton of coke. The total quantity of gas made was 2·41 per cent. less than in the previous year.

Notices Served in South Wales.

In the case of the South Wales coalfield, it is, for once in a way, the expected that has happened; for last Friday the owners served notices upon their employees—who number some 150,000—to terminate their contracts on June 30. This, of course, means that, should the parties fail to come to an agreement before the date named with regard to the various matters outstanding, there will be a general stoppage of work throughout the coalfield. Already a keen desire is being shown by large users of steam coal to lay in a stock against the "rainy day" which appears to be in prospect. A struggle in South Wales—if it were confined strictly to that locality—would be a matter which would not directly affect the great majority of gas undertakings, seeing that they derive their supplies of coal from other parts. But would the fight be likely to be restricted to the South Wales field? This is a question which is of first importance to all users of coal—for whatever purpose it may be employed; and unfortunately it is a point upon which it is just at present impossible to speak with any very great amount of hopefulness. It has already been reported that the Miners' Federation of Great Britain have decided to support the South Wales men by every means in their power, and these means would presumably include the "putting on of the screw" by causing disorganization in other coalfields. As is so often the case with industrial (as with other) disputes, "one thing has led to another" so rapidly that it is doubtful whether the ultimate issue will be the same as that which was first of all raised. Of course, the Eight-Hours' Act is at the bottom of it all. But the points of dispute have passed through the phases of the automatic termination of the wages agreement, a reduction in wages, and the working of the sixty extra hours per annum; and now the crucial question is stated to be the operation of the mines in double shifts. Under the new conditions of working, it is obvious that working in two shifts of eight hours per day, rather than in only one, would generally prove more economical; and it is a saving to compensate for the extra expense which the new Act will involve, that the owners are bent on securing. But the double shift—like most of the other concessions they have been asked to make—does not meet with the approval of the miners, who urge various more or less convincing reasons for their attitude. Should the dispute eventually result in a "national" strike, the latest available official returns show that the number of workpeople who would be directly involved would be about 660,000. This figure includes others besides those who are members of the Miners' Societies, but whose employment would to all intents and purposes cease with the stoppage of the pits. It is stated that approximately the Federated Unions have a membership of slightly over 600,000.

Ancient and Modern.

We congratulate Mr. P. J. Pringle, of Burton-on-Trent, upon his success in getting the electricity press at the end of last week to advertise largely a most wonderful performance. At St. Peter's Church, Stapenhill, the electricity bill for two quarters has only amounted to £3 10s. 8d., against £13 7s. 7d. for gas in the corresponding quarters. The reason is simply due to a comparison between the most modern in electricity and gas-burners after the fashion of those that ruled in the early days of the gas industry. Osrams pitted against fishtails! Mr. Pringle must be fearfully hard up for instructive illustration of the marvellous savings to be effected by electricity if he has to fall back on such an instance of antiquated lighting as was continued in this church till Osram lamps were introduced. There will not be surprise at the amount of the gas bill when it is learned that there were no less than 288 (twelve coronals of 24 burners each) of these fishtail gas wasters in the church; while only 75 Osrams of 25-candle power each are now used. Supposing, instead of paying the capital cost of introducing electricity, the coronals had been converted, and 75 bijou inverted lamps of 25-candle power each had been introduced, each using a fraction over a cubic foot of gas per hour, what then would have been the saving compared with electricity? Will Mr. Pringle justify his illustration, and answer a simple question?

PERSONAL.

Mr. Arthur Escott, youngest son of the late Mr. James Escott, whose recent death is noticed elsewhere, succeeds his father as Manager and Secretary of the Llantrisant Gaslight and Coke Company.

Mr. A. Thomas, eldest son of Mr. Philip Thomas, Engineer and Secretary of the Wellington (Somerset) Gas Company, has been selected by the Directors of the Budleigh Salterton Gas Company as Manager to succeed the late Mr. W. Walker.

Mr. G. B. Gibbs, who for ten years has been Cashier of the Sunderland and South Shields Water Company, has been appointed Secretary, in succession to the late Mr. Sutherland; and Mr. R. W. Arrowsmith, the Assessor, will in future discharge the duties of Cashier.

Mr. Cecil Rhodes Armitage, Technical Assistant to the Preston Gas Company, younger son of Mr. Charles Armitage, the Engineer and Manager of the Lancaster Corporation Gas-Works, has been appointed to the position of Engineer and Manager of the Morecambe Corporation Gas-Works. Mr. Armitage was educated at the Royal Grammar School, Lancaster, and was afterwards articled to Mr. J. H. Brown, Engineer and Manager of the Nottingham Corporation Gas-Works, with whom he remained some time as Assistant.

OBITUARY.

The death occurred a few days ago, in his 70th year, of Mr. James Escott, the Manager and Secretary of the Llantrisant Gaslight and Coke Company, Limited. Deceased leaves six sons and two daughters.

We regret to record that the operation which Sir John Colomb underwent on the 17th ult., and which left him in an extremely serious condition, resulted in his death last Thursday. Deceased was born in May, 1838; his father being General G. T. Colomb. As already mentioned, he was one of the Directors of the Commercial Gas Company; and he was on the Boards of the Fanti Consolidated Mines, Limited, the Baths Club Company, Limited, and Chairman of the Kootenay Valleys Company, Limited.

The sudden death, in his 78th year, is announced of Mr. Thomas Bull, of Hornsea, who for some twenty years was Manager of the Kingston-upon-Hull Gas-Works, from which position he retired about nine years ago. On the death of Mr. J. A. Wade, the Chairman of the Hornsea Gas Company, Mr. Bull succeeded him, and held the post till he died. He was one of the earliest members of the British Association of Gas Managers, having been admitted in 1867. He passed into the Gas Institute, but severed his connection with it on relinquishing his managerial duties. He was also a member of the Hornsea Urban District Council. Deceased, who was held in great respect in Hornsea, leaves a son and two daughters.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 594.)

THE last week concluded on the Stock Exchange was a short one; for the House was closed for Whitsuntide on Saturday, and it was Derby week into the bargain. For all that, it was a busy and lively time, as there was an unusually heavy account to get through, which was quite enough, without requiring any accession of fresh business, to keep members well at it. Most of the leading departments were quiet enough; the animation being centred in South Africans, with Mines a good second. The gilt-edged division were adversely affected by another Colonial Loan, which was not welcomed with a rush, and the expectation of others to come. The opening was quiet, with a rather downward tendency in most lines except the busy ones above-mentioned, though Consols held on unchanged. Brighter views prevailed on Tuesday. Consols rose $\frac{3}{16}$, with several of the gilt-edged rank in sympathy, and Railways stiffened up a bit. Wednesday was the Derby Day, and was quiet as usual. Things in general were rather droopy, and realizations checked the rise in the popular markets. Thursday was devoted to the heavy settlement. The tendency generally was not unfavourable except in Government securities. Friday, was, of course, a very quiet day, but not weak. Government securities were firm, and the speculative lines showed some strength. Business in the Gas Market was quieter, like most other lines; but the general tendency was excellent. The remarkably steady advance in prices which has characterized several past weeks—healthy rises of a point or two in the week, and no fitful jumps—was well maintained, and many quotations kept creeping up. In Gaslight and Coke, the ordinary was very firm and commanded rather higher figures, changing hands at from 103⅝ to 104⅜. In the secured issues, the maximum fetched 88¼ free, the preference from 105¼ to 106½, and the debenture 86 and 86¼ (a rise of 1). South Metropolitan was very quiet at 123 and 123¾; and the debenture made 85⅛. Commercial 4 per cent. realized 108½, ditto 3½ per cent. 102½, and ditto debenture 82¾. In the Suburban and Provincial group, Brentford old was done at 251 and 251½, Hastings 3½ per cent. at 93¾, Tottenham "B" at 111⅛ (a rise of 1), and West Ham at 121¼ and 121¾. Both Ilford stocks had a good advance in view of the Company's successful issue of stock by tender. Both the Bombay and the Alliance and Dublin new further improved. In the Continental companies, Imperial was a point lower, at from 181 to 182½, the debenture made 96¼ and 97, and Union made par and 99½. Among the undertakings of the remoter world, Buenos Ayres changed hands at from 13⅜ to 13⅛, ditto debenture at 95, Cape Town at 4 special, ditto preference at 5⅛, Primitiva at 6⅛, ditto preference at 5¼ and 5⅜, ditto debenture at 97, and River Plate at from 14¾ to 14$\frac{15}{16}$.

ELECTRICITY SUPPLY MEMORANDA.

Some Surprises in Municipal Accounts—The Metallic Filament at Work Reducing Revenue—And Causing Uneasiness in the Electrical Manufacturing Industries—Incandescent Gas-Mantle Sales and Metallic Filaments—Life Tests of Metallic Filaments—Meter Certification and Perfidy.

SOME of the accounts for the past financial year of municipal electricity undertakings as they are being published, are creating a little surprise. The grip of the metallic filament lamp is beginning to be seriously felt in some places, and trade depression too in the past year has left its marks on many accounts. We do not pretend to notice here all the characteristics of the accounts of municipal electricity departments, but merely certain of the distinctive features, including such financial results as deficits and small profits, as these are the evidences of an old misplaced confidence as to what electricity venture would do for the towns concerned. Some towns have, admittedly, done very well; but in nearly all, in these times, and in some of the best quarters, there is a complaint, as to the metallic filament lamps dealing out an unwelcome injury to an already dearly-won revenue. Running down the experiences of a few towns, it is seen that Barnstaple last year incurred a loss of £476. Belfast had an increase in the number of units sold for lighting of only 2·2 per cent.; while the increase for power was 8 per cent. Birmingham showed a net surplus on the year's working of £10,000, which it is proposed to pay over in aid of the rates. The contribution of the Gas Department to public purposes last year was £90,890! In the previous year, the Electricity Department had a surplus of upwards of £29,000. Blackburn only made a profit of £1000. Brighouse had a deficiency of £483, though taking electricity in bulk from the Yorkshire Electric Power Company. At Burton-upon-Trent, the metallic filament lamps have had a marked effect on the accounts. The revenue only increased by £183, while the expenditure was up by £451. The revenue from private lighting decreased by £366, compared with the previous year; and the total revenue from this source is less now than it used to be six years ago, although the lamp connections have increased by 43 per cent. The best the Burton-upon-Trent undertaking can do is to show a surplus of £836. From Clacton, the Engineer reports that several large consumers have used less energy, and that there have been fewer arc lamps in use, and old and new consumers are taking advantage of the metallic filament lamps. The average load being lower, adverse effects are shown on the running costs. The Electricity Department of the Exeter Corporation reports that, although the business is prospering and increasing, the outlook is made somewhat anxious by the introduction of the metallic filament lamps. Already they have made the revenue stationary. Under former conditions, the installation increased about 10 per cent. annually, and the consumption of current and revenue advanced in ratio. Now, however, there is still the 10 per cent. increased installation annually; but the revenue does not move. From Grimsby, it is learned that, though there has been an increase in the number of consumers, the revenue has only advanced by £38; and this is attributed to the extension of the use of metallic filament lamps and to slackness of trade. The income of the Hampstead Electricity Department is down by about £3000; and it is stated that this is almost entirely due to the new lamps.

It will be seen from what has already been stated that the metallic filament lamp has much to answer for in its effect on the revenues of electricity undertakings. But among the surprises of the year's working are the lighting figures of Leeds. The decline in the consumption of electricity there for lighting has been 531,000 units, or about 10 per cent., "representing a loss in receipts of £7842;" while, in spite of an increase of 1563-horse power, or 18 per cent., in the motors connected to the mains, the revenue from this source shows a diminution of £1935, due to reductions in the scale of charges—the final result being a total reduction in revenue of £9288. From Marylebone, there comes an estimate of the prospects for the current year. It is "assumed" that there will be an increase of a million units sold, and that a profit of £1341 will be obtained. But this lucky event is contingent on the new public lighting scheme being in full swing by Michaelmas next. Stoke-on-Trent made a net profit in the past year of £141, as against £157 the previous year. West Bromwich only had an increase of £45 in the sales of electricity for private lighting. Middlesbrough claims a net profit of £852; and West Hartlepool a surplus of £714. It will be seen from the figures quoted that the lower cost of lighting by electricity has not made itself appreciably felt yet in attracting new consumers; and how to fill the growing void in business is the problem of the hour. The "Electrician" is of opinion that, during the "temporary" reduction of output brought about by the introduction of high efficiency lamps, "the development of the motor and heating and cooking loads certainly seems to furnish the best results." The use of the word "temporary" is a bold one, seeing the vast number of carbon filaments still to be displaced. Regarding the compensating power of the motor and heating and cooking load, four or five units have to be sold at 1d. to bring in the revenue of one unit at 4d. or 5d., and four or five units cost more to generate than one unit, and therefore will not yield the same amount of profit as one unit at the lighting rate. This obvious truth merely by the way!

Electricity supply undertakings are not the only part of the electrical industry that is suffering from the effects of the metallic filament lamp. Over a long course of years now, the electrical plant makers have been under dark clouds through both internal and external causes; and the Olympia and Manchester Exhibitions have not done them any good—at least that is what we gather from accounts showing the financial results of trading, and from the plaintive remarks of chairmen at meetings of shareholders. Depression in the electrical industry was already in full swing before the general dulness in trade set in; and now there has been a precipitous further drop in the volume of business, and for the reduced volume there has been severe competition from the manufacturers both at home and abroad. Among the companies who have been bitterly complaining of the present conditions of things are the Brush Electrical Engineering Company, Limited, the British Westinghouse Company, Limited, and Johnson and Phillips, Limited. Callender's Cable and Construction Company, Limited, are not over-pleased with the situation; but they have less cause for sorrow than the plant supply people. The Brush Company, for example, although they have appropriated £10,229 standing to the credit of the general reserve towards writing-off the loss on the year's working, are carrying forward a debit balance of £29,128. For the plant manufacturers, the metallic filament lamp has no doubt come at the worst possible time. It is true that electricity for lighting when the carbon filament lamp was contesting single-handed for indoor business, had practically reached saturation point; but there was then the continual little increments of business, plant maintenance and renewals, and so on, that brought grist to the mill of the plant maker. Now, though electricity consumers have only commenced to move from carbon to metallic filaments, the consumption of current has been reduced to such an extent that many stations have already a larger margin of spare plant than they require; and the prospects are that they will have more before the tide turns, and business begins to absorb the excess capacity again, otherwise than in a class of business that will be less lucrative than the old. In addition to this, it is confessed that the unassisted metallic filament lamp is incapable of making much headway in securing new custom. And all the time, through the inverted system of gas lighting, the gas consumer is being offered improved and still more economical lighting. The outlook is not a pleasant one for the electrical plant manufacturers. No new plant, no new distribution systems. The cable people, however, are doing better than the plant makers, owing to the central supply stations extending their lines in the hope of catching fish beyond the area of past operations.

As has been seen, our electrical rivals have not much at the present time upon which to congratulate themselves; and so their press has been trying to shed some little comfort around by variously reporting the statement of Lord Weardale, at the meeting of the Welsbach Company (*ante*, p. 463), that one of the factors from which the Company have suffered during the past year has been the metallic filament lamp. Of course, our contemporaries jumped to the conclusion that there had been a falling off in the sale of gas-mantles. "Among the causes of the drop in business in new gas-burners experienced by the Welsbach Incandescent Company," seriously remarks the "Electrical Review," "Lord Weardale names the competition experienced from metallic filament lamps." It is possible to suffer in business in more ways than by an actual drop. Just previous to the statement by his Lordship as to metallic filaments, he said the Company had "once more slightly increased their sales of mantles." So that there was no actual drop in the extent of the business; the chief thing from which the Company suffered was the increasing competition of Continental makes of mantles, and the consequent lowering of mantle prices, upon which depression of trade did not allow the Company to make a compensating expansion of business. Taken all in all, there is no drop in the quantity of mantles sold in this country. It is an ever-increasing business, though the decline in the number of mantles used (say) per consumer must have been considerable, in view of the greater longevity of the inverted gas-mantle than the old vertical form. One way at any rate in which the metallic filament lamp caused the Company to suffer, was owing to the necessity for spending money in controverting the gross misstatements of electrical people as to the cost of electric lighting having been reduced below that of gas—incandescent vertical or inverted burners—through the introduction of new electric lamps.

Lord Weardale spoke of the cheaper kinds of mantles having grown largely in favour, in contrast with the dearer and more durable types. It seems from the results of some tests presented by Herr O. Brandt in the "Elektrotechnische Zeitschrift," that users of metallic filament lamps must exercise care as to the types of lamps they purchase. In the comfortable quarters of a test-room, where neither shock nor other violence comes in to produce premature failure, Herr Brandt, on a steady voltage of 122, alternating current, tried two 32 Hefner unit Osram lamps, with the filament pointing downwards in the vertical direction. One of these was still burning after 1600 hours, while the other broke down at 1400 hours. These lamps gave rather more than their nominal illuminating power before the beginning and after the end of the tests. Two 50 Hefner unit Osram lamps equalled in life the 32 Hefner unit lamps; but they did not succeed in getting to their nominal illuminating power. Two other Osram lamps for 125 volts were tried—respectively 32 and 50 Hefner unit lamps. They were tested on the Berlin mains at 120 volts. The nominal candle power was not actually reached; and the life test was discontinued at 1400 hours. It would be of interest to know if these tests were continuous ones, or if the filaments were alternately cooled and heated as they are in ordinary use. The next lamps tested were 40 Hefner unit ones of the "Just" tungsten type. They lasted respectively only 77 and 100 hours. Three "Sirius" lamps of 25 Hefner units continued only about 150 hours. Three zircon 38 Hefner unit lamps by another maker, and credited with the attribute of being able to be used at any angle, did not do well. One with the filament pointing vertically upwards ran for 100 hours; a second, pointing vertically downwards, lasted for 200 hours; and a third, pointing in a horizontal direction, lasted only 15 hours. Other makes of lamps gave various accounts of themselves, ranging from 82 hours up to 390 hours. On direct current possibly some of these lamps would have done better; and the inconstancy of voltage on town mains, of course, put them to severe trial. Those, however, are conditions met with in ordinary service.

When we were dealing on May 4 with the Electric Lighting Acts (Amendment) Bill, it was mentioned that it contains a clause providing for the certification of meters. The remark was ventured that "this is good so far as it goes; but in the interests of electricity consumers, the more stringent and compulsory provisions of the Sales of Gas Act should be applied." The Parliamentary Committee of the London County Council are in part agreement with this view; though at present they refrain from asking that only certified electricity meters shall be used. However, they suggest that an attempt shall be made to get Parliament to amend the clause, so as to provide that a consumer shall be entitled to a certified meter without extra charge by the electricity suppliers for certification. Although certified, however, electricity meters are more prone than are gas-meters to wander from the path of rectitude. Confirmation of this is given by the "Electrical Review" in the following confession, which we will not maltreat by abbreviation:

> It is, perhaps, a fact that need not be too freely advertised, that electricity meters do occasionally go wrong and require replacement. If the error is on the fast side, the earliest indication will probably be a strong appeal from the consumer urging the supply authority not to be so devoid of conscience. If, on the other hand, the meter is running slow, the householder will probably remain in blissful ignorance till further orders, unless the meter department discovers that the consumption of electricity has gone down as compared with the similar quarter in the previous year, without adequate cause. To obviate this sort of thing, many supply authorities now make a practice of regularly changing the meter attached to any consumer's supply at intervals of (say) three years. Where trouble appears to be developing, the change is made whenever it appears necessary. A point in this connection, however, is worth noting. Unostentation may be overdone. It is not necessary to tell the world that an electric meter has gone wrong; but, on the other hand, it is due to the consumer to let him know that his meter is being changed. Some supply authorities omit to do this except in a casual way; and the result is confusion and strife. The best way to go about the work if there are indications that the meter is recording inaccurately, is to send an inspector to examine it in the first instance. If his report shows trouble, it is worth while sending a postcard at least a day in advance, saying that the supply authority's men will be calling at a certain time to replace the old meter with a new one. This gives the householder an opportunity of taking the final reading on the old meter and the initial reading on the new one. A good many consumers nowadays prefer to keep a check on the authority's readings; and if a meter is removed without due notice, they are apt to complain. And their complaint is not altogether without justification.

It is to be hoped that the little homily has been taken to heart by electricity purveyors.

NOTES FROM WESTMINSTER.

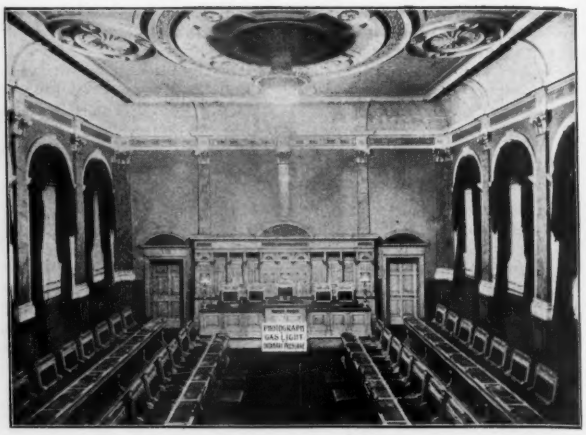
A LARGE amount of progress was registered in connection with Private Bills just before the recess; and already some of them have arrived at the goal of Royal Assent. Several additional measures have passed on to the second House, and are merrily pursuing their course without obstacle. The Yorktown and Blackwater Gas and Electricity Bill has passed under the review of Lord Onslow in the Lords; and there is to be no fighting over it in the Upper House. So that the Aldershot Company have given up, without any further wrestling, the area that was the bone of contention in the Commons. There is talk of the Dublin Gas Bill being opposed in the Lower House. This is not more than was expected; seeing that the Dublin Corporation—well, they are the Dublin Corporation.

Glamorgan Water Board Scheme. Consideration of the Glamorgan Water Bill commenced on May 10, and was only concluded last week. In the matter of time absorption, it holds the record for the session. The promoters are the Glamorgan County Council; and the object is to form a Water Board, representative of the local authorities concerned. The Board, it is proposed, shall acquire the undertakings of certain Water Companies and Local Authorities, and construct new works; but all the water undertakings and supply areas in the county are not included. When the Bill came before Sir Luke White's Committee, it was found that several local authorities and other large interests were assembled in opposition; but though there was so much opposition, there was also a substantial amount of local support for the measure. The Board, it is proposed, shall be constituted of representatives of the authorities whose districts are involved. The case for the Bill was that the population is increasing; and unless something is done, the time will come when there will be an inadequate supply of water in the county. For any considerable additional supplies of water, it will be necessary to go to the higher area beyond the coal measures; and such a scheme cannot be carried out by small individual water authorities. But some of the districts appeared to want to share in the scheme, without participating in the expense. Mr. Reginald E. Middleton is the Engineer to the project; and some of the figures he gave in evidence are interesting. He estimates that the total cost of purchasing existing sources of supply would be £593,598; and that the annual cost to the Board would be £35,043. The quantity of water sold per annum would be 2,797,727,000 gallons. Further expenditure would be required to complete the present works and to construct other works. The total estimate of the expenditure of the Board is £1,100,000. Mr. Middleton computes that in 1917 the population to be supplied will be some 570,000; and the supply then provided will be in round figures 10⅛ million gallons a day. The yearly revenue from this supply at 4½d. per 1000 gallons would be £72,145. As the estimated annual cost to the Board is £60,500, a profit of £11,645 is thus shown to be available for further extension of works. With the large increase of revenue, the cost of administration would be slightly reduced, probably by ¼ per cent., and this would increase the profits from £11,000 odd to £14,000. This would bring out the cost of the water per 1000 gallons to 3·6d. Mr. Middleton estimates the capacity of the sources of supply in 1917 at 12,000,000 gallons a day. Owing to the great cost of making new works, there can be no immediate economy except in management. It was suggested during the proceedings that a price of £325,000 had been provisionally agreed upon with the Pontypridd Water Company for their concern; but, failing ultimate agreement, the matter is to go to arbitration. Some amendments were made in clauses, affecting the question of representation. The preamble of the Bill was declared proved by the Committee. If it passes the Lords, there will be an opportunity, when the Act is reviewed in our columns, of showing precisely the final character of this large project.

Taxes on Lighting and Cooking Appliances in Germany.—At the sitting of the Finance Committee of the Reichstag last Friday, they passed duties on matches, incandescent mantles, and all kinds of lighting and cooking appliances. The lamp and stove tax is expected to yield £7,000,000 per annum.

SPECIMENS OF GAS LIGHTING BY THE CITY OF BIRMINGHAM GAS DEPARTMENT.

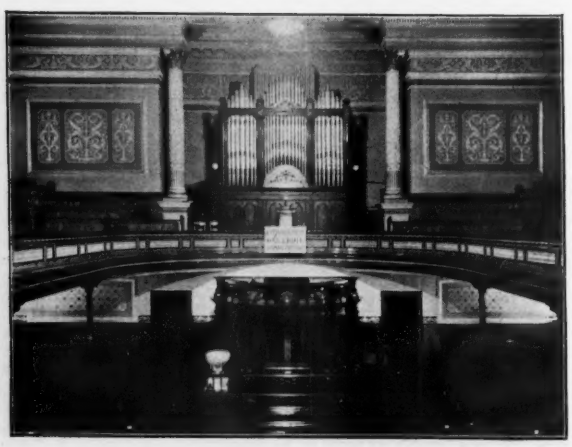
1.—Wesleyan Chapel, Coventry Road.



2.—Board Room at Parish Offices.

3.—Art Gallery—Italian and Industrial Hall.

4.—Friends' Hall, Moseley Road.



5.—Wesleyan Chapel, Moseley Road.

SPECIMENS OF GAS LIGHTING BY THE CITY OF BIRMINGHAM GAS DEPARTMENT.

6.—School of Art—Brass Workers' Room.

7.—St. James's Church, Edgbaston.

8.—Midland Institute.—Large Lecture Theatre.

By the courtesy of Mr. G. Hampton Barber, the Secretary to the Birmingham Corporation Gas Department, we are in a position to give the accompanying interesting photographs of some excellent specimens of interior gas lighting which are to be seen in the city. These really beautiful photographs, it may be mentioned, were taken with exposures varying from 4 to 5 minutes. The picture of the Art Gallery was the result of a 4 minutes' exposure, which produced a better photograph than was taken by daylight with an exposure of one hour. In the case of St. James's Church, Edgbaston, the exposure was for 5 minutes; and here a photograph by daylight is almost impossible, as the church is lighted with heavy stained-glass windows. A careful record has been kept of the number of mantles requiring to be renewed to secure efficiency in lighting. In the Art Gallery, the mantles have lasted for a period of fifteen months without renewal; and in the Wesleyan Chapel, in Coventry Road, only six new mantles were needed for 34 burners at the end of the fifteen months. The photographs and particulars furnish valuable testimony as to the efficiency of incandescent gas lighting. Below will be found details of the sizes of the buildings, number of burners, consumption per hour, total illuminating cost per hour, &c.

	1 Wesleyan Chapel.	2 Parish Offices.	3 Art Gallery.	4 Friends' Hall.	5 Wesleyan Chapel.	6 School of Art.	7 St. James's Church.	8 Midland Institution.
Seating accommodation—persons	800	100	—	1200	1000	—	900	1000
Number of gas-burners	34	40	132	46	44	25	58	80
Consumption of gas per hour—cubic feet	170	200	720	230	220	100	224	400
Total illuminating power	2720	3200	10,560	3680	3520	1750	4040	6400
Cost for lighting, per hour	4·2d. (1)	4·94d. (1)	15·73d. (2)	5·03d. (2)	5·85d. (3)	2·18d. (2)	5·96d. (3)	8·74d. (2)

(1) Gas at 2s. 2d. per 1000 cubic feet, less 5 per cent. (2) Gas at 1s. 11d. per 1000 cubic feet, less 5 per cent. (3) Gas at 2s. 4d. per 1000 cubic feet, less 5 per cent.

INSTITUTION OF GAS ENGINEERS.

Annual Report of the Council.

In previous issues of the "Journal," we have given a general indication of the arrangements for the forthcoming annual meeting of the Institution of Gas Engineers; and last week we published the titles of the papers to be submitted. The business on the opening day (the 15th inst.) will, as usual, include the presentation of the annual report of the Council, which is as follows:—

Membership.—The total membership at the end of the year 1908 was 825, compared with 804 at the close of the previous year—an increase of 21, made up as shown in the table below. The additions to the roll comprised one honorary member, thirty-three members, seven associate members (of whom three were previously students), two associates, and six students.

Class of Member.	At Dec. 31, 1907.	Elected and Transferred during 1908.	Deceased, Transferred, and Erased during 1908.	At Dec. 31, 1908.	Increase.
Honorary members	23	1	2	22	−1
Members	676	36	19	693	17
Associate members	92	7	5	94	2
Associates	..	2	1	1	1
Students	13	6	4	15	2
Totals	804	52	31	825	21

The Council regret to record the deaths of the following members since their last report.

Honorary Members.

Sir George Livesey	London
Alphonse Salanson	Paris

Members.

James Drory	Aix la Chapelle
Walter W. Fiddes	Bristol
Henry Green	Preston
Charles W. Jones	Rome
George R. Love	Guildford
John Nicholls	Crewkerne
William Walter Norris	Maryport
John Power	Sheffield
George Smedley	Buxton

The death of Sir George Livesey, elected an honorary member in 1903, removes from the roll the honoured name of one who had in many ways assisted in promoting the objects of the Institution. Becoming a member of the British Association of Gas Managers in 1864, he served as its President in 1874, and was made an honorary member in 1879. In 1882, under the auspices of the Gas Institute, he was the first recipient of the Birmingham Medal.

The Council, feeling sure there would be a strong desire that steps should be taken on behalf of the gas industry to perpetuate the memory of his life and work, convened a preliminary meeting at which various suggestions were considered. These were submitted to a well-attended and representative meeting, when, after full discussion, it was resolved to invite subscriptions to a Memorial Fund having for its object the endowment of a Livesey Professorship in Gas Engineering and Fuel at the Leeds University, for which at least £10,000 would be required. Reference was made at the meeting to the great practical interest which Sir George had taken in the existing Professorship of Gas and Fuel at the University, by obtaining annual subscriptions for its maintenance, and in other ways showing his sympathy with, and appreciation of, the value of the work carried on there.

A circular inviting subscriptions was accordingly issued to the members of the Institution and of the Society of British Gas Industries, to all the gas undertakings in the United Kingdom, and to others interested in the movement. Publicity was also given to the opening of the fund through the medium of the Daily and Technical Press, with the result that a total amount of £9793 18. 7d. has been subscribed to date, made up as follows;—

No. of Subscribers.				
11	Institution, District Associations, and Junior District Associations	£310	11	6
194	Members of the Institution	858	7	7
154	Gas companies	7,002	8	0
19	Gas committees of corporations	508	5	0
54	Members of the Society of British Gas Industries	538	1	0
24	Other manufacturers, coal owners, &c.	205	8	0
86	Other subscribers	370	0	6
542		£9,793	1	7

Annual General Meeting.—Under the presidency of Mr. W. Doig Gibb, the annual general meeting of the Institution (the forty-fifth since its establishment in 1863 as the British Association of Gas Managers) was opened at the Institution of Mechanical Engineers, Westminster, kindly lent by the Council of that body, on the 16th of June, and continued there on the following day; the final sitting being held the next morning in the Congress Hall of the Franco-British Exhibition, Shepherd's Bush.

The following communications were read and discussed, and a lecture on "The Combustion and Thermal Decomposition of Hydrocarbons," illustrated with experiments, was delivered by Professor William A. Bone, B.Sc., F.R.S., Professor of Fuel and Metallurgy at the University of Leeds:—

"Co-Partnership," by Sir George Livesey, of London.
"The Extraction of Cyanides and Manufacture of Yellow Prussiate by the Davis-Neill Process at the Linacre Gas-Works, Liverpool," by Mr. Edward Allen, of Liverpool.
"Refractory Material," by Mr. Frederick J. Bywater, of Birmingham.
"Recent Experience with the Dessau Vertical Retorts," by Mr. A. F. P. Hayman, of Berlin.
"Description of the New Gas-Works at Valby, Copenhagen," by Mr. J. O. V. Irminger, of Copenhagen.
"Continuous Carbonization in Vertical Retorts," by Mr. H. W. Woodall, of Bournemouth.

The three medals which are offered annually in connection with the papers read have been awarded by the Council as follows: London Gold Medal to Mr. H. W. Woodall, of Bournemouth, for his paper on "Continuous Carbonization in Vertical Retorts;" Institution Silver Medal to Mr. F. J. Bywater, of Birmingham, for his treatise on "Refractory Material;" and the Institution Bronze Medal to Mr. A. F. P. Hayman, of Berlin, for his contribution on "Recent Experience with the Dessau Vertical Retorts."

On Wednesday, the 17th of June, a reception and dance was given by the President and Mrs. Gibb, at the Galleries of the Royal Institute of Painters in Water Colours. There was a large attendance; and all the arrangements made for the enjoyment of the members and their friends were greatly appreciated.

At the conclusion of the meeting, a visit of inspection was arranged to the Gas Section of the Franco-British Exhibition, which had been organized with great success by the Committee of the Gas Engineering Section as the exhibit of the gas undertakings of the United Kingdom.

A three days' visit to Berlin to inspect the new gas-works of the City, and especially the vertical retort installations, on the invitation of the German Society of Gas and Water Engineers, was also included in the programme of the meeting, and will long be remembered by the members (about 80 in all) who had the pleasure of taking part in it. Nothing could have exceeded the warmth of the welcome which was everywhere extended to them by their German friends and colleagues; and the Council desire to express their very cordial acknowledgments of all that was kindly done by the Society, with Mr. Ernest Körting as its Acting President, by the Berlin Municipality, and by the Imperial Continental Gas Association, to render the occasion extremely interesting and pleasant.

An excursion to Brighton, which about seventy attended, took place on Friday, the 19th of June, when, by the kindness of the Directors of the Brighton and Hove Gas Company, their works at Portslade were thrown open to the members.

Affiliation.—Following on the announcement made in the Council's last report that the North British Association of Gas Managers had become affiliated with the Institution, it is gratifying to notice that no fewer than twenty members of the Association have joined the Institution during the past year.

The names of members appointed by the District Associations as their representatives on the Council for the year 1908-9 are as follows:—

Eastern Counties Association	Mr. E. J. Brockway.
Irish Association	Mr. T. J. Reid.
Manchester District Institution	Mr. W. Whatmough.
Midland Association	Mr. Harold E. Copp.
North British Association	Mr. James D. Smith.
North of England Association	Mr. Herbert Lees.
Southern District Association	Mr. N. H. Humphrys.

Examinations in "Gas Engineering" and "Gas Supply," 1909.—Mr. W. Doig Gibb, Immediate Past-President, the Examiner in "Gas Engineering," reports that 311 candidates presented themselves for examination on the 24th of April, 116 taking the Honours and 195 the ordinary paper, against 291 candidates last year (101 Honours and 190 Ordinary); and Mr. J. H. Brearley, the Examiner in "Gas Supply," reports that there were 315 candidates examined in that subject on the 1st of May, consisting of 80 in the Honours and 235 in the Ordinary Grade, compared with 193 candidates—41 Honours and 152 Ordinary—last year. At the request of the Technology Committee of the City and Guilds of London Institute, a Committee of the Council, in conjunction with the Examiner, considered whether any revision in the syllabus of "Gas Supply" was desirable; and, as a result, various modifications were suggested, and have been approved and adopted.

Gas Standard Burner.—During the past year the Council, in conjunction with the Committee of the Gas Companies' Protection Association, have given consideration to the suggestion that steps should be taken for introducing a Bill into Parliament to prescribe a standard burner to be used throughout the United Kingdom for the official testing of the illuminating power of gas, "so that the returns everywhere in the United Kingdom would be comparable, and so that all parties dealing with gas lighting questions, from the Houses of Parliament down to the consumer of gas, would have a definite standard of comparison." It was decided that, with the object of obtaining the views of the Board of Trade on the proposal, an interview should be sought with the President. This was accordingly done, with the result that the Parliamentary Secretary to the Board of Trade (Mr. H. J. Tennant) courteously received a joint deputation at Whitehall Gardens, when the whole matter was put before him. He promised

to give it his careful consideration, and to report to the President of the Board of Trade the arguments brought forward, so that the Board would in due course arrive at a decision on the subject.

Visit of the Société Technique de l'Industrie du Gaz en France.—In connection with the visit of the Société Technique de l'Industrie du Gaz en France to England in June, under the presidency of M. André Coze, the Council had the gratification of entertaining the Committee of the Society; the occasion proving most enjoyable to all who were present.

The Special Purposes Fund.

During the past year the following matters have been dealt with in connection with the Special Purposes Fund of the Institution [the list of contributions to which, and the accounts, are appended to the report]. The valuable work in the interests of the gas industry which the fund has rendered possible will be apparent; and the Council trust that increased support will be given by gas undertakings to enable the present important investigations to be continued, and others initiated.

Carbonization.—The Sub-Committee having in hand investigation of the various methods of carbonization (Messrs. A. E. Broadberry, Charles Carpenter, Thomas Glover, and S. Y. Shoubridge) report that, having regard to the great development that has taken, and is taking, place in the use of vertical retorts and in carbonizing in chamber settings, they feel it would be impossible to submit any conclusive statement on the subject at present. They are keeping in touch with the work that is going on in this and other countries, and have under preparation for presentation at the forthcoming meeting a report showing the progress which has been made in the methods of carbonization during the last twelve months.

Gas for Heating Purposes.—The investigation into the hygienic and economical applications of gas for heating purposes, which is being carried out under the direction of the Sub-Committee (Messrs. John Bond, J. H. Brearley, and Charles Wood, with whom Professors Arthur Smithells, William A. Bone, and Julius B. Cohen are kindly co-operating, as representing the Leeds University), has been continued in the department of Fuel and Metallurgy by the late Chemist to the Committee, Dr. Julien Drugman, and by his successor, Mr. E. W. Smith, M.Sc. The report of the Sub-Committee's experimental work, with explanatory note by Mr. Smith, will be presented to the Institution at its coming meeting as a communication to be read and discussed.

Fellowship in Gaseous Fuel.—With reference to the Institution Fellowship at the Leeds University, of the value of £100 per annum, to which Mr. Arthur M. Forshaw, M.Sc., was appointed in October, 1907, the Senate, on the recommendation of the Board of Science and Technology, awarded the Fellowship to him for a second year. The results of his work on the relative "mantle" efficiency of carbonic oxide and hydrogen, in which he has been occupied under the direction of Professor Bone in the Fuel and Metallurgical Laboratory, will be given in the form of a paper for reading and discussion at the Institution's forthcoming meeting, under the title of "The Efficiency of a Gas in Relation to Incandescent Lighting." Having completed the term of his fellowship, Mr. Forshaw has been selected to fill a responsible appointment as Chemist in a large gas appliances manufactory—a circumstance which indicates the practical value of the training his fellowship enabled him to secure. The Senate of the University will in due course award the fellowship which is offered by the Institution for the year 1909-1910.

Refractory Materials.—The English Ceramic Society started in January, 1908, a movement having for its object the grading and standardizing as far as possible of the refractory materials such as fire-clay, magnesite, &c., used in the construction of furnaces, &c. It received an impetus from the discussion which followed Mr. Bywater's paper read before the Institution in the following June; and shortly afterwards the Council were invited to appoint representatives to attend a conference on the matter with representatives of the Society and other interested Associations. The subject being of such vital interest to the gas industry, the Council gladly accepted the invitation by appointing Mr. John Bond, Mr. F. J. Bywater, and Mr. Edward Jones. Their report, dated 22nd February, 1909, which has been accepted and adopted by the Council, is as follows:—

Report of Conference on Refractory Materials.

We beg to report that we attended the meeting held at Stoke-on-Trent on Jan. 4, to consider the advisability of forming a Joint Committee to consist of representatives of all the industries interested, for the consideration of the standardization and improvement in the supply of refractory materials.

It was unanimously decided to form such a Committee, and to invite such allied industries and societies as were not represented to assist in the work to be undertaken.

A *résumé* of the proceedings has appeared in the Technical Press.* The most important decisions were:

1.—That each sub-section of the Joint Committee should consider and inquire into the requirements of the industry represented by them.

2.—That they were to use their discretion as to the best means of doing this, either by the co-option of other members to act with them, inviting opinions through the Technical Press, or any other means they thought fit.

3.—After obtaining reliable data on all points touching the supply and behaviour of refractory material now in use, and formulating what are considered to be the demands of the industry in this respect, the Sectional Committee should discuss their conclusions with the representatives of the manufacturers, and afterwards report to the Joint Committee for consideration of same.

4.—That each section should be asked to contribute £3 3s. towards the expenses of the Joint Committee.

Subsequently your representatives held a meeting at which it was decided that the questions in which the gas industry is most concerned are as follows:—

(*a*) The name and origin of refractory materials at present in use at the various gas-works.

(*b*) Temperature of furnaces and plant in which such material is employed, including producers, retorts, retort-settings and combustion chambers, &c., water-gas generators, superheaters, and carburettors, &c., and whether such temperatures are continuous or intermittent.

(*c*) Sizes of bricks, blocks, and tiles, and length and section of retorts employed. Cement clays used.

(*d*) General remarks and criticisms of the material now employed, with analyses.

(*e*) Suggestions as to the improvement, both in material, sizes, and patterns, and limits of deviation therefrom; also as to the standardization of sizes of bricks, tiles, and retorts, &c.

(*f*) The preparation of standard specifications.

(*g*) The necessity for an independent laboratory for the testing of refractory material.

So that the inquiry into, and information collected, may be as full and reliable as possible, we think it advisable to invite a number of other engineers and gentlemen (about six or eight) known to be interested in this subject, to join our Sub-Committee. Not more than three meetings should be necessary.

Mr. F. J. Bywater has been asked, and consented, to act as Honorary Secretary of the Sub-Section.

We shall be glad to receive the approval of the Council to the proposals herein outlined.

To enable the Sub-Committee to proceed with their investigations, the Council have voted a sum of £50 from the Special Purposes Fund.

Unification of Gas-Threads.—The President (Mr. Thomas Glover) and Senior Vice-President (Mr. James W. Helps) were appointed to represent the Institution at a conference on this subject organized by the Société Technique de l'Industrie du Gaz en France. Their report, containing various recommendations, which the Council have accepted and adopted, is as follows; and it may be added that arrangements have been made for another conference on the subject early in June, 1909, when it is hoped that a satisfactory decision will be arrived at.

Report of Conference on Unification of Gas-Threads.

We have pleasure in stating that we attended the International Conference held in Paris in June, 1908, which had for its object the standardizing of a thread which should be universally adopted in connection with pipe connections.

It was pointed out that at the present time two forms of thread are in general use: (1) The Whitworth. (2) The Sellers. The first-named thread is adopted in England, and also, with some slight modifications, in Germany and other parts of Europe. It has an angle between the slopes of 55°, while the threads are rounded at the crests and roots so as to leave a depth of thread equal to 0·64 times the pitch. The "Sellers" thread is used in America. It has an angle of 60°, with the threads flattened or truncated at the roots and crests.

Both the French and American representatives strongly advocated the adoption of the Sellers or American thread, with some modifications; and finally a table was drawn up, a copy of which we append (Schedule A), giving the recommended diameters and pitches of the thread having an angle of 60° truncated to the extent of $\frac{1}{8}$, and made with a slight taper.

It was also resolved that it was desirable that a further meeting should be held in about six months' time, when the members would have had an opportunity of submitting these recommendations to the different interested societies in their own countries. We, as your representatives, had to content ourselves with the statement that if the objections raised to the adoption of a screw with an angle of 55° were proved to be as grave as suggested, we would not then oppose the principle of the 60° angle; but that, inasmuch as the matter had but lately received the careful attention of the Engineering Standards Committee, who had already issued a report on the subject in which they recommended the adoption of the Whitworth standard, we thought there was little chance of their reconsidering their decisions when we brought the matter before them.

Since the conference, it has transpired that the standard actually adopted for pipe-threads in America is not the "Sellers" but the "Briggs," which fact was not mentioned at the meeting. This standard has the same angle as the "Sellers," but has a theoretically sharp V section. There seems, however, to be considerable doubt as to what the actual contour of the thread is, as the thread as made does not appear to entirely coincide with its theoretical definition. We beg here to draw attention to the resolution on the subject lately passed by the American Gas Institute, a copy of which we append (Schedule B).

We have during the past few months been in frequent communication with Mr. Leslie S. Robertson, the Secretary of the Engineering Standards Committee, who strongly oppose the decisions of the International Commission, and as strongly recommend that our Institution should adhere to the findings of their body.

The Engineering Standards Committee have prepared a reasoned technical statement for the adoption of the British standard pipe-threads, a copy of which we append (Schedule C). They also offer to co-operate with us in the matter, and to arrange for the attendance of their representatives at the next conference in company with our own delegates. We believe that a careful perusal of the reasoned statement referred to will indicate the importance of making a strong stand against the proposals of the International Commission; and we therefore recommend that the offer of the Standards Committee be accepted with

* See "JOURNAL" for Jan. 26, 1909 (p. 230).

thanks, and negotiations entered into with the officials of the conference to secure the attendance of the representatives of the Committee, together with our own delegates.

We should like to point out that at the last conference the representatives of certain countries were in a considerable majority, while others were not adequately represented. We trust, therefore, that at the next meeting this matter will receive careful consideration, and that steps will be taken to secure really representative voting, so that the decisions arrived at shall be in accord with the views of the majority.

SCHEDULE "A."

The results of the deliberations of the First Session of the Commission (June, 1908) were as follows:—

1.—Adoption of an angle of 60° for threads, with a ⅛ cone-shaped end, for screws, on the Sellers American system.

2.—Adoption of the following diameters and threads for the dimensions of 11 mm. (0·44 inch) and upwards:—

Diameters in Millimetres.	Threads in Millimetres.
11, 13, 17	1·4
21, 26·5	1·8
33, 42, 48, 52, 60	2·3
70, 73, 76, 89, 101·5, and 114	3·2

3.—Adoption of conic junctions, as in the United States and England.

SCHEDULE "B."

1.—Whereas the American standard pipe-thread is the Briggs V thread, which ensures the maximum tightness of joint by utilizing practically the full theoretical depth of the thread, the bottom being filleted and the top rounded only enough to strengthen the pipe sufficiently at the groove and preserve the true contour of the apex; and whereas the American standard screw-thread for bolts and nuts is the Sellers thread, which is truncated to three-quarters of its theoretical depth in order to secure greater strength, but which consequently does not attain the tightness of joint that is essential in pipe work; therefore the American Gas Institute urges the adoption of the American standard pipe-thread, and not the American standard screw-thread for an international pipe-thread. In other words, this Institute urges the universal adoption for pipe work of the Briggs V thread, and not the Sellers truncated thread.

2.—Whereas a change of one-half of a millimetre in the outside diameters provisionally recommended by the International Committee for the following four sizes of pipe will make the entire list practically coincide with American standard diameters and with the diameters (except 2½ inch) adopted by the British Engineering Standards Committee, therefore the American Gas Institute recommends that the suggested sizes of 11 mm., 13 mm., 21 mm., and 33 mm., be changed to 10·5 mm., 13·5 mm., 21·5 mm., and 33·5 mm. respectively; also that the pitch for 10·5 mm. diameter be 1 mm. instead of 1·4 mm.

3.—Subject to the above qualifications, the American Gas Institute endorses the proposed international system of pipe-threads, and will use its best efforts to secure its adoption throughout the United States.

SCHEDULE "C."

The Engineering Standards Committee, having had, through the courtesy of the Institution of Gas Engineers, an opportunity of considering the resolutions arrived at by the Conference for the Unification of Gas-Threads held in Paris in June last, desire to call the attention of the Council of the Institution of Gas Engineers to the following points:

1. *General*—The Committee would point out that the Whitworth form of thread and pitches which have been adopted by the Engineering Standards Committee have been in general use for a considerable number of years throughout not only the British Empire but also Germany and many other Continental countries; and they are of opinion that the Institution of Gas Engineers should not give their countenance to any departure from general practice unless grave and weighty reasons for such departure can be advanced.

The fact that the British pipe-thread standards have been formally adopted throughout Great Britain, coupled with the fact that they are the result of an immense amount of deliberation by those best qualified to form an opinion, and that a standard set of gauges for them has been deposited with the National Physical Laboratory, renders it improbable that any other standard now put forward in opposition would be generally accepted in this or other countries now working to the Whitworth thread.

The Committee would point out that there are two forms of gas threads in use: (*a*) The Whitworth form, which has an angle of 55°, with the crest and root equally rounded off until the depth of thread approximately equals 6·4 times the pitch. (*b*) The Briggs form, which has an angle of 60°, and theoretically an almost sharp V section, though in practice this form does not appear to be adhered to.

2. *Form of Thread.*—It is found in practice that the Whitworth form of thread, with its rounded crests and roots, maintains its shape almost permanently, which is of the highest importance for pipe-screwing, particularly in the smaller sizes; while the sharp crests and roots of the Briggs thread wear to an approximation of the Whitworth form. In the selection of thread form for an international standard, the Committee would urge that it is better to select that form of thread which is the more easily maintained; and this has been one of the governing factors in the British Committee's deliberations. Further, the Whitworth form of thread does not weaken the pipe to the same extent as the Briggs, because it cuts less deeply into the pipe, has crests and roots rounded to an easy curve (instead of the almost sharp V), the pitch is generally finer (11 threads as against 3), and the pipe is therefore stronger, both as regards the stripping of the thread and the strength of the pipe under the thread.

3. *Pitch.*—The pitches of the original Whitworth standard have been retained by the Engineering Standards Committee of Great Britain. The pitches put forward by the Commission agree closely with British and German practice up to 2 inches nominal bore, with the exception of ⅛ inch, for which size 18·1 threads per inch is suggested as against the British 28 threads and the American 27 threads. Such an alteration would seriously inconvenience all countries concerned. Above 2 inches the pitches suggested by the Commission are similar to those in use in America (8 threads); whereas the German (11 threads) agree throughout with the British Standards, which have been found to give uniformly good results on all sizes, both as regards strength and tightness. On the other hand, the thread above 2 inches nominal bore proposed by the Commission has 7·9 threads, which latter is far too coarse for the smaller tubes, and requires much greater thicknesses than are usually necessary. Even in cases where thicker tubes are called for, the coarse threads reduce the strength without any corresponding advantage being obtained. If pipes have to be made thicker to meet this nothing is gained, owing to the deeper threads unduly weakening the pipe end, since the strength of the pipe depends on its weakest section.

4. *Gauge Diameter.*—The following is a definition of the term "Gauge diameter," drawn up by the Engineering Standards Committee, and refers to the same dimension as that referred to by the International Commission as "Diamètre extérieur": The gauge diameter is the full diameter of the standard male screw gauge which the coupler to be used with a pipe of that size is required to fit. It may, therefore, for all practical purposes, be regarded as the full diameter of the coupler screw. [By *full diameter*, the Committee understand a dimension equal to twice the maximum radius of a screw, measured at right angles to the axis.]

As stated, the pitches and form of thread in German practice and the British standard are identical; the only differences being between the gauge diameters on certain sizes. These differences are, for the most part, insignificant; the differences being no more serious than those existing between different British manufacturers prior to the adoption of the British standard table, the introduction of which is being effected with comparatively little inconvenience. As a matter of fact, the German gauge diameters are practically identical with the dimensions originally worked to by a large number of manufacturers in Great Britain.

5 *Proposed International Standards.*—The proposals of the Commission, as they at present stand, seem to have been prompted by an endeavour to combine, as far as possible, German and American practice. They appear to approximate closely to the existing German gauge diameters on the one hand and the American pitches on the other.

The British standard thread and the proposed international thread should be carefully compared with the existing German thread, since pipe-threads closely approximating to the German standards have been in general use throughout the length and breadth of the Continent. If, therefore, it is proposed to establish an international standard, the line of least resistance should be the one selected, and a standard adopted which will cause the least trouble and inconvenience. In the Committee's opinion, these conditions are fulfilled by the British standard, which approximates as nearly as possible to existing European and Colonial usage.

As mentioned above, the adoption of the British standard would involve comparatively small alteration in the German gauge diameters. The pitches would not have to be altered, and very little trouble would be caused. On the other hand, in adopting the proposed international thread, though hardly any alteration in the gauge diameters would be required, the alterations of the pitches would be so serious as to entail a maximum amount of trouble and inconvenience both to consumer and manufacturer. The proposals of the Commission do not agree with German, American, or British practice, and run a severe risk of not being adopted in Great Britain and her Colonies or the Continent of Europe.

The Committee therefore feel fully justified in most strongly urging the Institution of Gas Engineers to press for the adoption of the Committee's standards.

LESLIE S. ROBERTSON, *Secretary.*

Standard Clauses in Contracts.—By desire of the Society of British Gas Industries, representatives of the Institution were appointed by the Council to consider with a Committee of that Society, a set of standard clauses for contract specifications suggested by the Society as suitable for adoption. Several combined meetings were held for the full discussion of the whole matter, with the result that a set of 29 clauses were unanimously recommended to the respective Councils of the Institution and the Society for their consideration and approval. The clauses were subsequently accepted and adopted by them, and a copy issued to every member of the Institution and of the Society.*

International Unit of Light.—The British Electrotechnical Committee (consisting of Mr. Alexander Siemens (President), Sir Wm. Preece, K.C.B., F.R.S., Colonel R. E. Crompton, C.B., Mr. W. Duddell, F.R.S., Mr. Kenelm Edgcumbe, Sir John Gavey, C.B., Dr. R. T. Glazebrook, F.R.S., Mr. R. Kaye Gray, Mr. Robert Hammond, Colonel H. C. L. Holden, F.R.S., Dr. Gisbert Kapp, Mr. T. Mather, Mr. H. W. Miller, Mr. W. M. Mordey, the Rt. Hon. Lord Rayleigh, O.M., F.R.S., Captain H. R. Sankey, R.E. (ret.), Mr. C. P. Sparks, Mr. J. Swinburne, F.R.S., Dr. S. P. Thompson, F.R.S., Mr. A. P. Trotter, Mr. E. B. Vignoles, Mr. C. H. Wordingham, Mr. P. F. Rowell (Honorary Secretary), and Mr. C. le Maistre, Secretary of the International Electrotechnical Commission, requested the Council to appoint a representative of the Institution to co-operate with the Committee in the question of an international standard of light; and Mr. James W. Helps, who consented to serve in that capacity, reports that he attended a meeting held at the Institution of Electrical Engineers on the 23rd of February last, when the memorandum as to photometric units which had been prepared and submitted to the representatives of the various countries was considered, and adopted. [See *ante*, p. 439.]

Warming of Factories and Workshops.—The attention of the Council having been called by the Master Printers' and Allied

* The clauses were given in the "JOURNAL" for March 16 last (p. 772).

Trades' Association to questions arising from the use of gas-heated steam radiators in factories and workshops, the matter was referred to a Committee consisting of representatives of the Gas-Stove Section of the Society of British Gas Industries and of the Institution, who are now dealing with it in conjunction with the Gas-Heating Research Committee.

Architects and Heating by Gas.—In association with the Society of British Gas Industries, the Institution has also had under consideration suggestions for a conference with architects on the subject of heating by gas. The Council feel that such a conference would be of great advantage, and hope that it will be found possible to arrange for it to be held.

THOMAS GLOVER, *President.*
WALTER T. DUNN, *Secretary.*

May 25, 1909.

IMPERIAL INTERNATIONAL EXHIBITION.

Interior Gas Lighting.

IN the "JOURNAL" last week, and for May 11, references were made to the part that gas is taking in the International Exhibition at Shepherd's Bush. In the earlier one, it was mentioned that Messrs. A. E. Podmore and Co. were lighting the Bahamas House, and Mr. William Edgar the Chinese Pavilion. In the lighting of the latter, Mr. Edgar has supplied his "Eclipse" pattern lamp. This is constructed of a strong all-copper casing, with enamelled shade, and fitted with bye-pass cock, and gas and air adjusters, so constructed that either large or small mantles can be used. It is altogether a handsome, strong, and very effective inverted lamp. In the lighting of the Bahamas House, Messrs. Podmore and Co. have supplied thirteen three-light inverted lamps. Each burner, the makers inform us, gives approximately 150-candle power for the consumption of 4 cubic feet per hour. From this it will be gathered, the Bahamas House is one of the best-lighted exhibits in the place. The outside of the building, besides being lit with two three-light "Globe" lamps, is now being prepared to take six dozen small gas-lamps of variegated colours, which will make the appearance very attractive to the passer-by.

Duration of the World's Coal Supply.—At the annual general meeting of the Institution of Mining Engineers, which was opened at Burlington House on Thursday last, the President, Dr. R. T. Moore, devoted his address to the subject of the coal output of the world. He said that, notwithstanding all the economies introduced in connection with the use of coal in various industries, the total consumption continued to increase, and the problem was how long this valuable mineral would last. If the output of coal continued to increase at the present average rate, the world's supply would be exhausted within the next five hundred years; but that it would continue to increase so rapidly, one could hardly believe. However, long before this period expired, some way might be found of doing without coal. In any event, they might safely leave their descendants to solve their own problem in their own way.

Presentations to Officers of the Derby Gas Company.—On Saturday, the 22nd ult., the Engineer of the Derby Gas Company (Mr. J. Ferguson Bell) presented to Mr. W. E. Caton, the Assistant-Engineer, a handsome clock and aneroid barometer, on behalf of the staff and employees. On the clock was the following inscription: "Presented to Mr. W. E. Caton by the staff and employees of the Derby Gaslight and Coke Company, on the occasion of his marriage—27th May, 1909." At the same time, Mr. Edgar Foster, the Engineering Assistant, was presented with a gold watch, on which was inscribed: "Presented to Mr. Edgar Foster, by the staff of the Derby Gaslight and Coke Company, on his leaving for Sydney, N.S.W.—May, 1909." Subsequently, the announcement appeared that on May 27, at the Parish Church, Duffield, Derbyshire, by the Rev. J. F. Alexander, William Eames, eldest son of the late James Caton, of Shefford, Beds., and Mrs. Caton, of Hitchin, was married to Lily, younger daughter of Frank Tatlow, Esq., of Avenue House, Duffield.

"Field's Analysis" for 1908.—We have received from the compiler (Mr. George Orford, Assistant-Accountant to the Gaslight and Coke Company) a copy of the above-named work, in which, as our readers are aware, the accounts of the principal gas undertakings in England, Scotland, and Ireland are analyzed on the basis originally laid down by the late Mr. John Field, whose work has been much improved upon by his successor. As this is the fortieth year of publication, the book does not call for detailed notice. It may be mentioned, however, that the first part is devoted to the accounts of the London and Suburban Companies; the second, to those of selected English Provincial and also Scotch and Irish gas undertakings in the hands of companies and corporations; and the third, to comparisons of some of the principal items in the analyses with those of previous years—from 1904. These are followed by three appendices. The first furnishes details of the coal carbonized, oil and spirit used, and gas made; the second shows the amount of capital employed per 1000 cubic feet of gas supplied on the days of maximum delivery; and in the third will be found particulars of the number of ordinary and prepayment consumers at the close of last year. The "Analysis" is published by Messrs. Eden Fisher and Co., at the price of 15s.

INSPECTION OF FACTORIES.

ACCORDING to the report for last year of the Chief Inspector of Factories (Dr. Arthur Whitelegge, C.B.), there was an increase in the number of places under inspection; and at the close of 1908 it reached 260,000 factories and workshops, apart from warehouses, docks, wharves, quays, and other premises which, although not technically factories or workshops, come under the Factory Acts for certain purposes. Owing, however, to the general slackness of trade, there was a reduction in the volume of employment; and Dr. Whitelegge says that to this must be attributed in great part the otherwise satisfactory decline in the year's total of accidents—viz., 1042 fatal, compared with 1179, and 121,112 non-fatal, against 123,146. The report of the Chief Inspector is followed by a summary of the sectional reports, prepared by his Deputy (Mr. H. M. Robinson), who directs attention to their various salient features. These reports occupy about 200 foolscap pages, and appended to them is a general index—a useful feature which has hitherto been absent. We notice below some of the matters of interest to "JOURNAL" readers referred to by the divisional and lady inspectors.

The Superintending Inspector for the South-Eastern Division (Mr. A. P. Vaughan), when alluding to the temperature of workrooms, states that compliance with the provision in section 6 of the Act of 1901, requiring a reasonable temperature in factories and workshops, and with the condition that the means adopted should not interfere with the purity of the air, has improved and become more general, but not without much activity and vigilance on the part of the inspectors. He says "the objectionable and uneconomical method of warming by means of unventilated gas-jets, which contaminate the air, dies hard; and many occasions to condemn it have arisen, particularly in alien workshops in East London." The use of flueless gas and oil heating stoves has been noticeable; and the inspectors have not failed to explain to occupiers the objections to which they are open, including their possible interference with the purity of the air. He adds that certain types of flueless stoves are, however, alleged to consume the deleterious products of combustion. The extension of the manufacture and use of water gas and other similar gases for driving engines, heating furnaces, boilers, &c., and for many other industrial purposes, has drawn increased attention to the dangers of carbonic oxide poisoning. Mr. Vaughan says the inspectors have freely circulated memoranda showing the causes of past casualties, and furnishing structural and administrative precautions and "first aid" methods where gassing occurs. One case was due to an accumulation of unburnt gas; another to an escape through a testing cock being inadvertently left open; a third was owing to lack of competent first aid; a fourth was the result of repairing an engine before sufficient time had been allowed for the gas to escape; and a fifth was due to a leakage in a producer.

Mr. Augustus Lewis, the Superintending Inspector for the South-Western Division, records a case of poisoning by carbon monoxide, reported to him from Bristol. It occurred in a very remote part of the district, with electric lighting plant driven by gas-engines supplied with producer gas. A clearance or "sweeper-out" pipe had been left to end just outside the engine-room, about 8 feet from the floor, near one of the producers which the man affected had daily to keep fed with fuel. He did not get gassed in the usual way of sudden weakness and insensibility; but, if he were not consumptive (which appears doubtful), he seems to have been gradually weakened and poisoned by the periodical escapes of producer gas into the room where he worked, though the room was open to the air in parts. He is supposed to have breathed this gas daily in quite small quantities, until he died. No inquest was held.

Mr. J. A. Redgrave, reporting upon the Midland Division, says he learns from one of the inspectors that particular attention has been paid to the ventilation of engine-houses where Mond and suction-gas plants are used. He states that in one particular instance, the fumes from Mond gas were perceptibly noticeable in the rooms of the factory; and on inquiry he found the workers complained of headache very frequently. The occupier was requested to adopt better means of ventilating the engine-house, which was situate directly under one of the workrooms; and a fan was provided in the window of the engine-house. This had the effect of clearing the atmosphere of the room. But as the fan discharged the fumes into an enclosed yard, the remedy was not sufficient to clear them from the premises; and the manager agreed to provide a ventilating-shaft from the fan to a point above the eaves of the factory.

In the Wolverhampton district, there were last year several cases of small producer-gas plant houses in which no special ventilation at all was provided in the roof of the building, in spite of the fact that the whole plant had been installed by firms well acquainted with the properties of the gas, and with the danger consequent on even a small leakage of it in a close and badly ventilated house. Two fatalities from gassing recently occurred at the Birmingham Gas-Works. Both men were engaged in positions subject to escapes of gas, and were probably affected by carbonic oxide; but the actual cause of death in each instance was the injuries produced by falling. At the beginning of the year, a case was reported where a man, being "dazed" by suction gas, lay down in the open air. Later he was helped home, and in a few days developed pneumonia. The new sheet of instructions

orders the person overcome by gas to be taken into warm, fresh air. A case occurred in a chemical works, caused by sulphuretted hydrogen. The man was working in the open, and the gassing appears to have been due to want of care; but the oxygen bottle quickly restored him. The South Staffordshire Mond Gas (Power and Heating) Company's works, which are situated at Dudley Port, supply gas for power and heating to about a hundred factories in Wolverhampton, Bilston, Wednesbury, and Walsall. During the four years in which the works have been in existence, there has been no fatal accident from the gas, either in the Company's own works or in those of the people supplied. Each customer is furnished with a placard setting out clearly the danger from the gas, and containing instructions for the treatment of persons suffering from it. Mr. Crampton, the District Inspector, reports that there is every reason to believe that the Company faithfully observe all the restrictions imposed upon them.

The report by Mr. J. A. Hine, the Superintending Inspector for the North-Eastern Division, contains the following remarks on the subject of electricity :—

Electricity is being extensively used in the Stockton district as motive power; and during the past year it has been successfully applied to rolling-mills, where hitherto there has been difficulty in constructing electric motors capable of withstanding the sudden application and release of heavy loads, peculiar to such processes as rolling metals. Electrically driven machinery, newly introduced into works, is often found to be of a design dangerous to the persons employed—giving one the impression that the designer's attention was so taken up with securing the mechanical efficiency of the machinery, that the question of safety to the operator was left to be settled later as the result of stern experience. Cables carrying alternating currents at high voltages have been found loosely hung about the cabin of the operator, and even coiled about the floors; switches have been found with badly insulated handles, and fuse wires without any guard or cover. Portable electric lamps, with handles made wholly of brass, are frequently to be seen in use at various works. These defects become of greater importance owing to the increasing use of electricity in the manufacturing processes, where men totally unacquainted with the dangers of electricity have to take charge of such machinery. Two fatalities were due to electric shock. In the first case a boy stumbled and fell against an electric arc lamp which had been lowered close to the ground; in the second case, a young person was entrusted with the dangerous work of painting the fittings inside a transformer station, and he accidentally touched a live wire.

Mr. Hine's report also contains an account, furnished by Mr. Bennett, of a serious accident which occurred in the exhauster-house in a small gas-works, whereby two men lost their lives and a third was severely injured. The accident was noticed in our columns at the time. The exhauster was of an old type, with a bye-pass containing a hanging non-return flap-valve in the same casting. A blank flange had been put in place of the valve, and was being withdrawn and the valve reinserted at the time the accident occurred. To replace the valve, the covering of the bye-pass chamber had to be removed—thus allowing large volumes of unpurified gas to enter the room. The exhauster was to be driven by a gas-engine in the same room; and the ignition-tube of the engine had been lighted a little while previously, so as to be warmed-up and ready to start. As soon as an explosive mixture of gas and air had formed in the room, it was fired by the ignition-tube light, and a disastrous explosion followed. This accident, says Mr. Hine, emphasizes the necessity of having duplicate exhausters in all cases, with separate bye-passes, which can be completely isolated from the gas-circuit for necessary repairs.

Mr. R. E. Graves, the Superintending Inspector for the Northern Division, gives particulars furnished to him by Mr. W. Buchan, the District Inspector for Edinburgh, of two explosions due to accumulation of gas in bakehouse ovens, from the gas-jets being fixed within the oven to enable the baker to see inside. He says gas-brackets are now being fixed outside, and passed inside when required. Thus the oven door cannot be shut until the gas-pipe is withdrawn. Mr. Graves also learnt from Mr. A. Newlands, of Dundee, that he had noticed in some works the absence of safety lights in places where gas was likely to accumulate; and he said he had urged upon the occupiers the necessity for using portable electric lamps.

The report of the Principal Lady Inspector of Factories (Miss A. M. Anderson) contains some important remarks on the temperature and lighting of workrooms. She says the close connection between these matters in factories and workshops is again brought out by most of the inspectors, both in their routine and in their annual reports. Several of them point to the advance that has been made in means for artificial lighting, and contrast it with the slowness of the progress made in securing the full available daylight, and with the various obstacles to the satisfactory heating of workrooms. For the first time in her personal experience as an inspector, she learned early last year of a prosperous factory, with large workrooms containing many workers, in which the occupiers tried to maintain the position that a few unventilated gas and oil stoves were sufficient for the maintenance of a reasonable temperature. She says many more complaints reach her of low temperatures than of excessively high ones. Miss M. M. Paterson, one of the Lady Inspectors, who have charge of certain institution factories and workshops, makes the following remarks:—

In no respect has more advance been made than in the artificial lighting of factories and workshops. I wish this could be said with respect to the natural lighting, which is of more importance than is realized. The introduction of incandescent gaslight and of electric light has not only given the workers better light, but has done so without too greatly increasing the temperature, vitiating the air, or leaving a sooty deposit on walls and ceilings. Of course, it is much best to have the lighting agent not also a heating agent; but in workrooms where ordinary gas-burners are used for lighting, for even an hour or two in the day, the introduction of other means of heating is very often resisted. The enforcement of the heating provisions of the Act seems to resolve itself largely—in the South particularly—into a warfare against unsuitable means of heating. The many varieties of stoves on the market seem, with their cleanliness and simplicity, so well adapted for heating small spaces, and they meet the requirements of the occupiers as well as of the insurance agents. They fail, however, to ventilate the room as a good coal-fire does; and when unprovided with flues they have a decidedly bad effect, and one hears from workers of headache and loss of appetite where these are used. As a rule, the provision of a flue is not a difficult matter; and objection to gas as a means of heating cannot be maintained if the fumes are removed. The chief danger, then, is undue economy in the number of stoves provided, for these do not, as a rule, heat a large area; and there is a tendency to put one where three are actually required. Gas is likely to be the chief means of heating, in small workrooms at least, until the cost of electricity is much less than now; and therefore it is of paramount importance that those means which tend to increase the impurity of the air should not be permitted.

Miss Anderson gives particulars of some proceedings she took against the occupiers of a factory in a northern town. It had been built fairly recently, but no means of heating had been provided. In the early morning, the gas-jets were lit; and this had the effect of partially heating the rooms. But at the same time it vitiated the air. Early in March, Miss Whitworth visited the factory, and not only noted the temperature of the rooms (which varied from 45° to 54°), but also took samples of the air, which, when analyzed, showed in one case as much as 32·8 parts of carbonic acid per 10,000. Although Miss Anderson realized that these conditions were serious, she was not prepared, when she began to collect evidence for the case, for the actual consequences entailed by work in the factory. She took into Court the death certificates of four girls who had been strong and healthy girls prior to working in the factory, and whose parents had shown no trace of consumption; yet after a few years of work these girls had died—in every case of phthisis. The standard of health was so low, that she had no hesitation in saying in her opening statement that, unless alterations were made, the factory must become, if it had not already become, a hotbed of consumption and disease. The case evoked the greatest interest in the district, and the Court was crowded. During the dinner hour, some of the workers from the factory collected outside the Town Hall, eagerly awaiting the decision. The Bench, which consisted of twelve Magistrates, listened with the greatest patience to the evidence. Among others called as witnesses were Mr. W. J. A. Butterfield, F.I.C., F.C.S., Dr. Legge, and Professor Symmers, of Queen's College, Belfast.

The case ended in a conviction, with a penalty of £1 and £5 costs. Miss Anderson says this prosecution was an important one; for it is difficult to imagine any way in which consumption could be more rapidly spread than by requiring workers to sit in rooms in which the ventilation is such that the air contains 32·8 parts of carbonic acid per 10,000.

Miss A. M. Newton offers the following observations on a case which she had under inspection:—

The rooms were generally well lighted; this being necessary in order to ensure careful work. It seems a pity, however, that one cannot forbid artificial light being used at times when daylight is available; and I found not a few rooms so constructed or situated as to render it impossible for the sunlight to reach to all parts of them. The air was then usually vitiated by gas fumes; but even where electric light is used the workers must be affected to some extent by being deprived of the health-giving properties of sunlight. The kind of artificial light used, was often undesirable, especially in tailors' factories and workshops, where, as a rule, one finds a large flickering fantail burner close to the head of each worker, which must be injurious to her sight and general health, and which renders the air of the room very impure on account of the large amount of gas consumed. Electric or incandescent gas lights have in a few cases been substituted with good results, though the workers have at first protested against the innovation, feeling that it was necessary for each to have her own burner.

The report of the Electrical Inspector of Factories (Mr. G. Scott Ram) furnished particulars of accidents which occurred in electricity generating stations and sub-stations last year. In the stations owned by companies and local authorities furnishing a supply of electricity by way of trade, as well as those in the possession of railway companies, there were 311 non-electrical and 74 electrical accidents; three of the former and two of the latter being fatal. The accidents in private stations numbered 51, of which 35 were non-electrical and 16 electrical; but in no case did death result. The largest number of electrical accidents (35) occurred during the cleaning, repairing, &c., of "live" switchboards or other conductors. There were 222 non-fatal and 12 fatal electrical accidents in factories, engineering works, &c., last year. Of the former total, 42 occurred in connection with portable apparatus, connectors, and flexible wires, and 26 with unprotected conductors, switches, terminals, fuses, &c. There were 32 persons (22 of them skilled) injured while working on live conductors; and 55 in testing operations and in other ways.

Daylight Saving Bill.—Giving evidence last week before the Daylight Saving Bill Committee, Mr. W. Willett, the promoter of the scheme, stated that, headed by the City Corporation, 112 popularly elected bodies, representing over 15 million people, had passed resolutions in its favour.

THE RECENT EXTENSIONS AT THE COLOGNE GAS-WORKS.

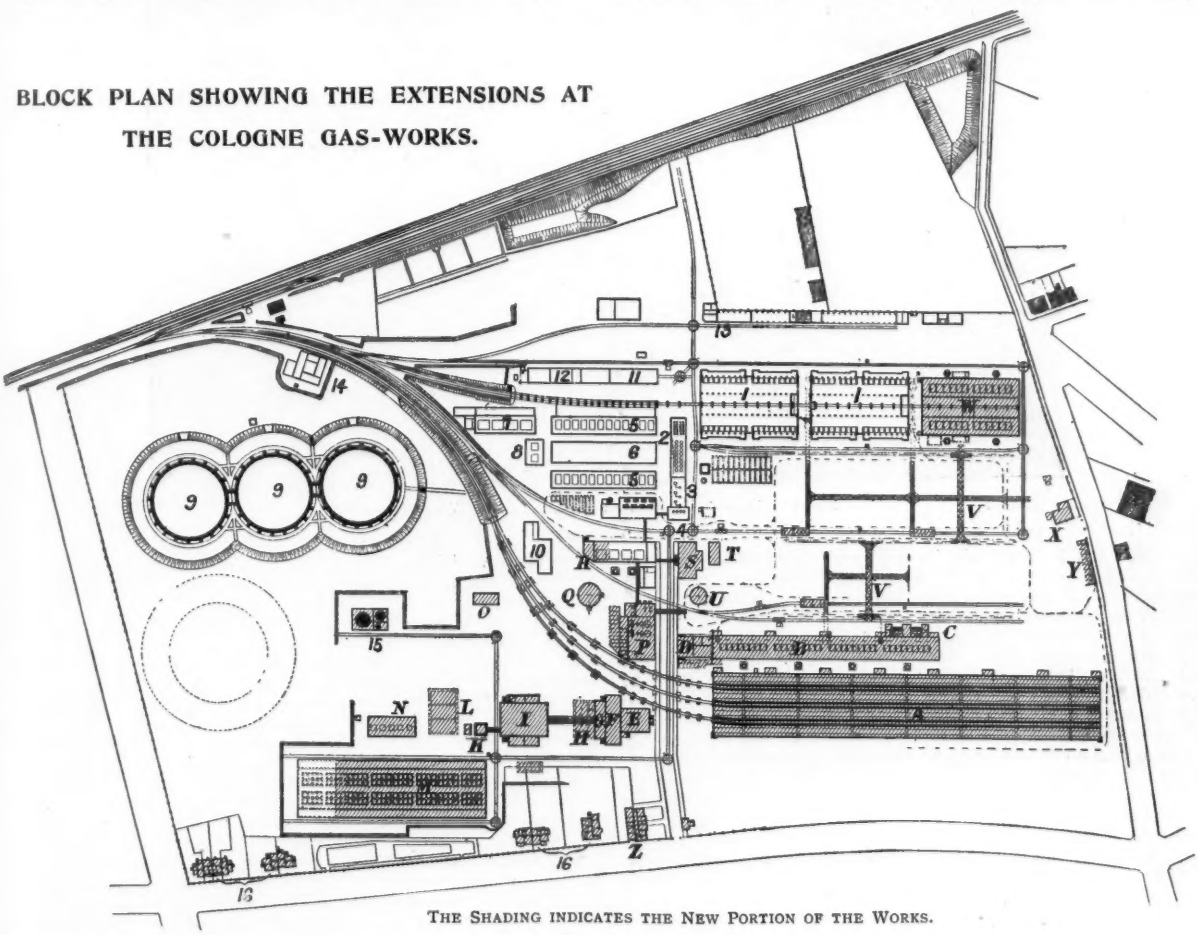
REFERENCE has been made in the "JOURNAL" in the past two years (Vol. XCVIII., p. 1002, and Vol. CII., p. 562) to the extensions which have recently been carried out at the Cologne Gas-Works, and in particular to the large installation of vertical retorts there. Herr Prenger, the Engineer of the Cologne gas undertaking, has published, in a recent issue of the "Journal für Gasbeleuchtung," some further particulars of the new buildings and plant at the works; and we propose to give in the sequel an abstract translation of this article, together with a few illustrations kindly furnished by Herr Prenger, some of which did not appear in the pages of our German contemporary.

The Cologne Gas-Works were erected in the years 1875-6, according to plans drawn up by Herr A. Hegener, who then acted as Manager of the gas and water undertaking of the Municipality. The works are situated in the suburb of Ehrenfeld, and are bounded on three sides by public roadways and on the fourth side by the railway running from Cologne to Aix-la-Chapelle. The site has an area of 27 hectares (about 66½ acres)—sufficient for the erection of plant of a productive capacity of about 17½ million cubic feet per diem. The plant installed in the first instance on the site had, however, only about a quarter of this capacity. The ground level was such that railway communication by an easily-graded incline could be secured, with the viaducts running to the coal-stores. The rails of the viaduct are 14 ft. 9 in. above the level of the retort-house stage. The coals can thus be shot direct from the trucks on to the coal-stores at the back of the charging stages. Each coal-store, when filled to a height of about 10 feet, accommodates 2500 tons of coal. This storage was adequate so long as the coals were delivered in quantities approximately corresponding to the consumption at the time. When, however, the coal deliveries were uniformly distributed over the whole year, the storage space was no longer adequate, and stacking in the open was resorted to. It was found that not only was considerable expense incurred in wages for picking up the coal stored, but also that great depreciation of the coal ensued.

The coal was charged into the retorts by means of scoops manipulated by hand. The coke was also drawn by hand and conveyed by waggons to the coke-yard, which was at the same level as the retort-house stage. The coke was carried up an incline from the yard to waggons on the railway. Mechanical elevators and conveyors were thus dispensed with. There were three retort-houses, each of which originally contained four benches, each comprising ten settings of seven retorts; so that there were in all 120 settings. The retorts had a cross section of about 15 in. by 21 in., and were charged five times in twenty-four hours. The charge amounted to about 3 cwt. of coal. Each setting therefore produced some 53,000 cubic feet of gas per diem; so that the maximum output of each retort-house was 2,120,000 cubic feet. In course of time, however, nine benches were converted, so that each contained eight beds of nine retorts of larger cross section, and accommodating charges of nearly 4 cwt. The productive capacity of each retort-house was thus increased to 2,825,000 cubic feet per diem, except that three benches of the old beds of seven retorts remained in one of the houses.

With the increase in productive capacity, the difficulties of manual stoking became intensified, and trials were constantly being made with charging machinery; but the results were not sufficiently promising to justify its introduction. The dimensions of the existing retort-houses were unfavourable to mechanical stoking. Neither was it possible to instal inclined retorts without a complete reconstruction of the houses. On the other hand, the frequent cases of injury to the muscles of the back due to the lifting of the heavy scoops, and the general demand for improvement in working conditions, led to the decision to erect entirely fresh plant as soon as an increase of consumption called for extensions, and subsequently to rebuild the old retort-houses. The extensions were started in 1902. The make of gas has continuously increased from 1,033,780,000 cubic feet in the working

BLOCK PLAN SHOWING THE EXTENSIONS AT THE COLOGNE GAS-WORKS.



THE SHADING INDICATES THE NEW PORTION OF THE WORKS.

A. Coal-Store.
B. Inclined-Retort House.
C. Bath-Rooms.
D. Experimental Works.
E. Condensers.
F. Exhausters.
G. Tar-Extractors.
H. Tar-Tank.
I. Washers.
K. Reservoir Tower.
L. Liquor Wells.
M. Purifiers.
N. Meter-House.
O. Carburetting Plant.
P. Water-Gas Plant.
Q. Water-Gas Relief Holder.
R. Boiler-House.
S. Electric Power Station.
T. Condensing Tower.
U. Experimental Gasholder.
V. Coke Distributing Plant.
W. Vertical-Retort House.
X. Coke Screening Plant.
Y. Coke Retailing Depôt.
Z. Offices.
1. Old Retort-Houses.
2. Condensers and Washers.
3. Exhausters.
4. Tar-Extractors.
5. Purifiers.
6. Revivifying Space.
7. Check Purifiers.
8. Meter-House.
9. Gasholders.
10. Governor-House.
11. Locomotive-Sheds.
12. Workshops.
13. Laboratory.
14. Fire-Clay Mill.
15. Oil and Benzol Tanks.
16. Officials' Houses.

year 1898-9 to 1,650,400,000 cubic feet in the year 1907-8. These figures represent a make of 3092 cubic feet per head of the population of Cologne in 1898-9, rising to 3566 cubic feet per head in 1907-8.

The extensions contemplated in 1902 comprised: (1) The erection of water-gas plant of a productive capacity of 3,390,000 cubic feet per diem; (2) the construction of coal-gas plant to make 6,360,000 cubic feet per diem; and (3) reconstruction of the old works for a make of 6,360,000 cubic feet per diem. The capacity of the works would thus be raised to a maximum of about 16,104,000 cubic feet per diem, or to an output of about 3200 million cubic feet per annum. When this extension has been completed, further increase in the consumption of gas will best be met by erecting a second gas-works in another part of the town, as the mains to the town and the railway connections at the present works will then be working up to their full capacity. It is intended that this second works shall have water as well as railway communication.

The extensions first put in hand comprised the erection of water-gas plant of a productive capacity of 1,695,000 cubic feet; two sections of coal-gas plant, of 4,240,000 cubic feet total capacity; and the equipment of one of the old retort-houses with 24 beds of vertical retorts. The last-named plant has been described in detail, with illustrations, in the "JOURNAL" for June 25, 1907, p. 1000; and the results obtained on working were given in the issue for June 2, 1908, p. 562. On reference to the plan of the works given to-day, it will be seen that the new retort-house, marked B, has been erected parallel to the old retort-houses; the large intervening space having been set aside for the storage and sorting of coke from both plants. Regard had to be paid to the regulations of the Prussian State Railways as to the disposition and working of sidings communicating with the State Railway lines, and also to the regulations which require that a circular space 394 feet in diameter round about the storage tanks for oil and benzol must be left free from any building. The oil and benzol for the use of the carburetted water-gas plant had therefore to be stored in tanks in the isolated position shown at 15 on the plan. The position of the boiler-house at R rendered it expedient to group round it the buildings requiring steam—such as those containing the water-gas plant, and the exhausters and the electric power station—so as to reduce as far as possible the length of the steam-mains. The water-gas plant, indicated by P in the plan, moreover, had to be near the coke yard, with a view to reducing the distance over which the coke would have to be conveyed to it. The opposite end of the coke yard was devoted to the breaking and sorting plant, and to the depôt for sale by retail. The foregoing indicates the main considerations on which the arrangement of the various buildings on the works was settled. The position of the works on the outskirts of Cologne rendered it desirable to provide dwellings on the spot for the officials. The necessary houses, indicated by 16 on the plan, were erected on one side of the works near the offices *Z*.

The constant increase in wages and in the price of coal, and the more difficult relations with the workmen, made it advisable in the designs of the new gas-works to provide, as far as possible, for replacing manual labour by machinery, and even where

Interior of the Coal-Store, on the Level of the Viaducts.

machinery could not actually be employed, to lighten as much as practicable the character of the manual labour. It was also necessary to be prepared for fluctuations in the delivery of coal by providing storage space for a very large quantity, and to protect the coal thus stored from risk of fire and of depreciation by exposure to the weather. This entailed the erection of a large coal-store A. It is true that opinions differ as to the value of a covered coal-store; but regard must be had primarily to the description of coal which is dealt with. At Cologne, practically Westphalian coal only is used; and experience has shown that for such coal a covered store is essential and economical. The apparatus generally selected for the works was chosen so as to deal with an increase over the present nominal output of the retort-houses of about 20 per cent. The situation of the various buildings was also decided to some extent with regard to the existing main, of 48 inches diameter (leading to the town), which intersects the works.

THE WATER-GAS PLANT.

The water-gas plant P is intended primarily as an auxiliary for use in winter, to take up the large fluctuations in consumption. As, however, only a limited proportion of water gas can be reasonably added to the coal gas, the size of the plant has for the time being been restricted to a make of 1,695,000 cubic feet per diem. It is intended ultimately to double it, so that when the coal-gas extensions are completed it will be possible to add 25 per cent. of water gas to the coal gas. In order not to be restricted to one mode of carburetting, the plant has been arranged to use either oil or benzol. Advantage can thus be taken of fluctuations in the market prices of the two carburetting agents. The water-gas plant was erected by the Cologne Engineering Company, and started work in January, 1905. It proved of great service during the strike of coal miners in the Ruhr district, and while there were some difficulties with the workmen on the gas-works. There are two sets of plant, each capable of making 847,500 cubic feet a day. Adjoining the generator room is the machinery room, in which there are two fans driven by electric power. Above the machinery room, and on the level of the working stage, is storage space for coke, which is conveyed thereto by an automatic overhead line worked by electric power.

The relief holder Q is of 35,000 cubic feet capacity, and may ultimately be extended to double this size. The condensers are placed in an adjoining room. Four purifiers of 1405 square feet area each are provided for the water gas in the same house (M in the plan) as the purifiers for the coal gas. They are placed on an upper floor in order that the ground floor may be available for the revivification of the oxide. The lids are dry-sealed. The changes are made by means of hydraulic valves, which are all operated from one point. The revivified oxide is raised to the upper floor by means of an elevator. After leaving the station meter the water gas passes into the carburetting house O, in which there are four small benzol tanks, which feed four evaporators heated by means of steam. The benzol vapour thus produced is passed into a large main, in which it is mixed with both the water gas and the coal gas.

The tanks for oil and benzol (No. 15 on the plan) are placed

Upper Part of the Retort-House, with the Coal-Conveying Plant.

Another View of the Upper Part of the Retort-House.

in pits sufficiently large to receive the whole of their contents. Benzol tanks of a capacity of over 10 tons have further, by the regulations of the local authorities, to be surrounded with masonry to a height of 8 feet, and with provision all round for quenching fire. Three tanks have been provided—one for oil, one for benzol, and one for tar oil, which is to be used for the extraction of naphthalene from the coal gas. The tanks are of sufficient capacity to provide for three to four weeks' full working of the water-gas plant. The store has a fire-proof roof; and artificial lighting is dispensed with. A 4-inch steam-pipe is laid direct from the boiler-house to the oil-store, to be used for quenching purposes in case of an outbreak of fire.

The transport of the coal on the works is carried out entirely on viaducts. The coke and constructional materials, however, are conveyed about the works on lines laid at the ground level; and where it has not been practicable to have curves of sufficiently great radius, turn-tables have been introduced. The waggons are shifted and the turn-tables actuated by means of electrically driven capstans. The smallest curve on the line has a radius of 590 feet, and admits of the passage over it of the largest goods waggons which ever come on to the works. The large-capacity coal-waggons in use on the railways have all been constructed to take curves of this radius. The viaducts are constructed of longitudinal girders supported on iron and masonry columns, so that a clear view of the works' yards is obtainable from them.

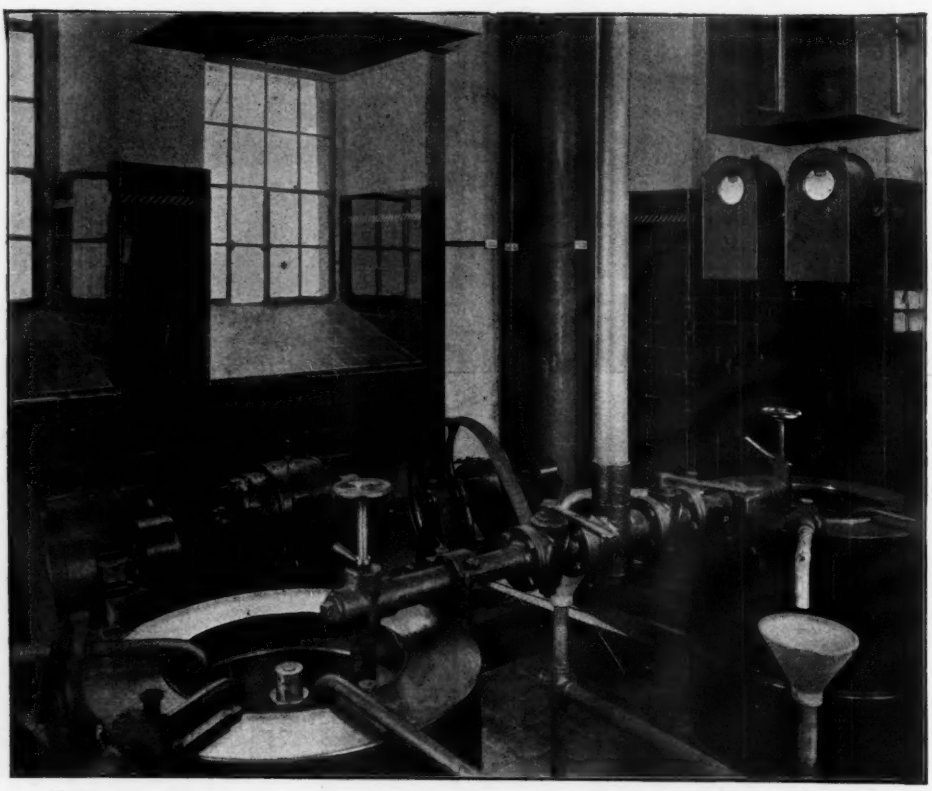
The Coal-Gas Plant.

The new coal-gas plant, as already stated, is to be for a daily make of 6,360,000 cubic feet. It will comprise three independent sections, which, however, will be so disposed that the gas can be transferred from one section to another between any two sets of apparatus, so as to avoid interruption of the work should it prove necessary to shut out a particular piece of apparatus. Only two of the three sections in question have so far been constructed. The coal-store shown at A in the plan has a length of 892 feet and a width of 148 feet, and accommodates about 35,000 tons. The substructure is of massive masonry, divided into 24 large and 8 small holds; so that any outbreak of fire should be confined to one of these holds. The coal is conveyed into the store by three railway viaducts, and is discharged by hand into the holds. The bottoms of the holds are sloping, so that the coal naturally remains at a uniform level without spreading by hand. This uniform levelling of the coal does not appear to have been secured by any of the pre-existing methods of constructing coal-stores. It is extremely useful when coal arrives in a very wet condition, as the coal can then be readily stored in thin layers until dry. The holds are emptied from above by means of three grabs, which are carried on travelling platforms so that they can traverse the whole of the store. The coal raised by the grabs is either transferred to an iron band conveyor, which runs along the north wall of the store, or to an electric line on the south side of the store, which transfers it to transverse band conveyors which take it directly to the breakers erected in front of the coal-store. The longitudinal conveying band on the other side of the store also deposits its coal in these breakers. The grabs can also load a train of eight Talbot waggons, which run along a viaduct to the old retort-houses; so that the new coal-store serves for the old part of the works also. The superstructure of the coal-store consists of iron lattice work. The roof is of corrugated iron, with a continuous louvre for ventilation. A view is given of the interior of the coal-store, on the level of the viaducts, in which will be seen the travelling grabs and, at the side of the house, the longitudinal conveyor.

The new retort-house B is parallel to the coal-store. It is intended to contain seven benches, each comprising eight settings of nine inclined retorts; but so far only four of these benches have been erected. Between every pair of benches provision is made for the preparation of the coal by means of an annex to the coal-store which is equipped with a coal-breaker and an elevator, by means of which the broken coal is raised to the retort-house. It passes over an automatically registering weighing-machine to either a rake conveyor or an iron band conveyor for distribution thereby into the coal-bunkers, which traverse the whole length of the house above the settings. Each elevator may serve two benches of settings. The whole conveying plant has a capacity of 40 tons of coal per hour. The coal distributing plant in the retort-house is entirely cut off from the retort-settings proper, so that the dust resulting from the distribution of the coal is kept out of the house. The conveying plant is in a special superstructure separately ventilated. Two views of the upper part of the retort-house with the conveying plant are given. The coal is discharged from the bunkers through shoots closed with lids, direct into Drory waggons in front of each retort, and is charged thereby into the inclined retorts, which are 5 metres (16·4 feet) in length and have a cross section of about 24 by 16 inches.

The coke is discharged into a trough conveyor running longitudinally through the house, and is taken by it either to the screening and breaking plant or to the coke yard. From the screens the coke is tipped into large reinforced concrete chambers, from which it can be loaded direct into railway waggons, which pass underneath the chambers. The coke in the yard is picked up by means of grabs or skips on a bridge crane, which can travel the whole length of the coke yard. The coke yard is 574 feet long and 394 feet wide; and the coke can be piled in it to a height of 26 feet. The coke conveying plant V, which was installed by the firm of Pohlig, of Cologne, is arranged so that the coke is not dropped from any appreciable height, and thus is not broken up seriously. At one end of the coke yard a new building Y has been erected for the sale of coke. For conveying the coke about the works, a narrow-gauge railway is provided. Attached to the new retort-house are bath-rooms C, having in the basement sixteen shower baths and two ordinary baths for the yard men; and on the first floor there are sixteen shower baths and five ordinary baths for the stokers.

At the western end of the retort-house an experimental gas-works has been erected. It is equipped with all the apparatus of a small gas-works for a make of 140,000 cubic feet per diem. It is not provided with a special setting of retorts; but any one of the eight settings in the first bench in the inclined-retort house, or two of the settings of vertical retorts, can be coupled up with it, as the settings in question have been provided with double gas and tar delivery pipes. The new works' condensers E, exhausters F, and tar-separators G, are all under one roof, but in separate rooms. The whole apparatus is arranged in two distinct sections. Each section has four atmospheric condensers, of circular cross section. In the exhauster-room there are three coal-gas exhausters, each capable of pumping 2,120,000 cubic feet, and one



The Tar Separator Room.

exhauster for the water gas, of 1,765,000 cubic feet per diem capacity. The exhauster room is large enough to take seven such exhausters.

The tar-extractor room contains two Pelouze and Audouin extractors for coal gas and one for water gas. In front of the room there is the tar well H. The gas passes by mains carried overhead to the washers I. Up to the present, naphthalene and cyanogen washers have not been installed; but space is provided for their introduction later. From the washers the gas enters the secondary condensers consisting of four wrought-iron tubular condensers for each section. It then passes into rotary washer-scrubbers of the brush type. Attached to the scrubber-house is pumping-plant for the supply of water to the works. It consists of three high-pressure centrifugal pumps which take water direct from three artesian wells and pump it into the high-level reservoir in the water-tower. There is also a room for the tar, liquor, and dirty-water pumps; another room for storing sulphate of iron; and another for other materials used in, and products of, cyanogen recovery.

The purifying-house M, already referred to, contains four vessels for each section of the works, as well as for the purification of the water gas. A new meter-house N has been erected, in which are installed one station meter for water gas, the drum of which has a capacity of 700 cubic feet, and two meters for coal gas, each with drums of 1050 cubic feet capacity. The floors of all the apparatus houses are placed 5 feet above the ground level, so that beneath them are cellars lighted by daylight, in which the pipes and connections are readily accessible. Between the scrubber-house and the meter-house, the water-tower K and the liquor tanks L are placed. The tower is seven storeys high, and contains at the top the works' water reservoir, under that a drinking water reservoir, below which are a liquor-tank and tanks for separated tar and crude tar. In the basement are two centrifugal tar-separators driven by electric power. A view is given of this tar-separator room. The whole of the apparatus rooms are lighted by electric incandescent lamps. The switches and fuses are, however, placed outside at the entrance to each building. The globes are mounted gas-tight, and are surrounded by a glass protecting globe.

The old boiler-house R has been enlarged, and four new tubular boilers, each having 2150 square feet of heating surface, with superheaters and Perret grates for the combustion of coke breeze under blast, have been installed. Bunkers for the breeze are placed over the boilers, with the necessary conveyors. The electricity generating house S contains three steam-turbines, of 180, 350, and 500 kilowatts respectively, with surface and reflux condensers. The turbines have been installed in different sizes so as to meet the varying load of summer and winter working. The whole of the machinery of the new plant is driven by electric power; the current being alternating at 220 volts pressure. Although the City of Cologne owns its own electricity works, which are under the same management as are the gas-works, it

appeared desirable that the gas-works should have its own boiler and generating plant, especially as coke breeze could be used directly under the boilers on the gas-works, and current could be generated as cheaply as at the large electricity works. The electricity supply of Cologne, moreover, is single-phase current, which was not so well adapted for the special power requirements of the gas-works, such as the coal and coke breakers and elevators.

The extension of the gas-works also involved the erection of new offices, which were placed in a more central and convenient position than the old building. The old and the new works' plant is connected by means of a main of 24 inches diameter; so that it is possible to pass the gas from the new settings into the old condensers and other apparatus, and the gas from the old settings into the new apparatus. This arrangement should prove invaluable in case of any breakdown of the plant, and also to enable apparatus to be put out of work entirely in the summer for thorough examination and cleaning.

Coal was first shot in the new coal-store on June 23, 1906. In the following September, the four new tubular boilers were brought into use, as well as the electricity generating plant. Before the end of the year, the electrically-driven plant previously employed was disconnected from the town supply and connected up with the new works' supply. Work was started in the new inclined retort-house on Nov. 28, 1906, with four settings; and by the end of that year sixteen settings were in action, and about the same time the first sets of the new apparatus and machinery were brought into use. The vertical-retort house, as already recorded in the "JOURNAL," started work in June, 1907. For the completion of the scheme of extension of the works, it has proved necessary to lay down a second high-pressure main from the works to the town, of 48 inches diameter, with, of course, a second governor. The working of the new plant has proceeded in a perfectly satisfactory manner, and any small initial troubles which were experienced were soon overcome.

EDUCATION & RESEARCH IN APPLIED CHEMISTRY

THIS was the subject of the address delivered by Professor R. Meldola, when, in the capacity of President of the Society of Chemical Industry, he opened the proceedings at the annual general meeting, held at the University of London last Wednesday. He pointed out that the lack of active interest by manufacturers in the educational side of applied chemistry, had been detrimental to their own cause. If left alone by the manufacturers, teachers were apt to become too purely "bookish;" and, on the other hand, if the manufacturers cut themselves adrift from the academic side of chemistry, they were likely to become too narrowly practical. The manufacturers could not afford to leave out of account the scientific chemist any more than the teachers could afford to ignore the technologist. The research chemist ought to be producible from Universities and Technical Colleges. With respect to the chemical technologist, the question was whether he could be produced under any of the existing educational curricula, or whether the factory was the only proper training-ground. He was a chemist *plus* a great deal more.

The factory was not the proper place for beginning technological training. During the supplementary period following the preparatory training in the technical school, there should be opportunity for research work. The supplementary advanced or technological training should do for industrial chemistry what the post-graduate training did for academic chemistry—it should enable the different orders of faculty to be sorted out. A few students would be found capable of development as research chemists; and a larger number as chemical technologists. The omission of research from their educational curricula meant a loss to their industry of a class of chemical technologist of whom they were in need—the man who had been trained in scientific habit of thought by the most effective of all known methods. If the preparatory training took three years, it was not too much to ask for an additional two years for the advanced course.

There was practically no technical school in the country which provided a complete and co-ordinated course of training such as he had advocated. For the chemical industries, the technical education movement had been arrested just at a stage where the true technical training should begin. The technical institutions were not wholly nor for the greater part to blame. The manufacturers had not sufficiently encouraged them. The Universities were now developing schools of applied science. The point was whether they ought not to create departments of applied chemistry. If the ordinary graduate courses were not suitable for the chemical technologist, they could be adapted without very much difficulty. But if the higher work was to be taken over by the Universities, the *raison d'être* of the technical school for chemical industry would become a thing of the past. It would be deplorable and wasteful if the University and the Technical Institution in the same town became rivals instead of colleagues. The rational solution was that the Technical Institution should become a school of the University, as was the case at Manchester. Such a solution carried with it the implication that the Technical Institution would raise its technological teaching to the University standard. This was precisely what was wanted. In framing any educational policy of practical value for their subject, the Society of Chemical Industry could play an important part.

SEVENTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

The Seventh International Congress of Applied Chemistry, to which the King and the Prince of Wales have given their patronage, was formally opened by His Royal Highness, who was accompanied by the Princess of Wales, in the Albert Hall last Thursday. This is the first congress to be held in London; the previous gatherings having taken place in Brussels, Paris, Vienna, Berlin, and Rome. Sir Henry Roscoe, F.R.S., and Sir William Ramsay, F.R.S., are respectively Honorary President and Acting-President. The work of the congress covers a wide field, as shown by the large number of sections—eleven in all—into which it is divided. The sectional meetings commenced last Friday at the University of London, the Imperial Institute, and the Royal College of Science, and were continued till yesterday. The official closing of the congress will take place to-morrow morning. Upwards of a hundred papers in various languages were entered for the consideration of the delegates; but only a few of them are of special interest to our readers. We notice two to-day, and others may be dealt with in future issues.

Herr A. VICTOR KOCHS, of Sheffield, submitted the following paper:—

THE KOPPERS COKE-OVEN AND BYE-PRODUCT PLANT.

Herr Heinrich Koppers, the inventor of these ovens, perceived all ovens laboured under the disadvantage that the walls could not be uniformly heated by the methods formerly in use. Hence arose the special feature of the original Koppers oven—a separate distribution of the gas and air for combustion on each side and along the whole length of the ovens, thus causing combustion to take place from a separate jet in each separate flue. The flues of the Koppers oven are vertical; and there being about thirty flues in each wall of the ovens, each oven is heated at about sixty different points, as against from six to twelve points in all other constructions of the time. The internal distribution of the gas and air among the heating flues rendered it absolutely essential that each jet should be accessible for regulation, so as to enable each jet to be adjusted in order to attain uniform heating; and the subsequent development was directed to the provision of means for controlling the regulation. The first improvement in this direction was to provide an opening over each single flue at the top of the oven, which was furnished with metal or fire-brick plugs. The removal of the plugs was effected in a few moments; and it was possible to ascertain and remedy any irregularity in the heating without the slightest difficulty, and almost as soon as the defect became noticeable.

The next improvement Herr Koppers introduced for regulating the combustion was the provision of a regulating sliding brick over the top of each vertical flue, and at a point where the gases of combustion pass out of the vertical flue into the top horizontal flue leading to the downtake to the chimney flues. This improvement has been found of the greatest advantage, inasmuch as it enables both the air and gas supply to be regulated to a nicety, which is not possible of attainment to anything like the same degree by any other system.

All regenerator ovens which were formerly built, and all others at the present time, with the exception of Koppers', are arranged with a single set of regenerators to serve the whole battery of ovens. Herr Koppers' next step was to provide separate regenerator chambers for each oven, thus rendering each oven entirely independent of the other. Of necessity, the heating of regenes rator ovens is of an alternating character, as the heating takeplace in one period of time (usually 30 minutes) in one-half of the oven walls, while in the next period the heating takes place in the other part of the oven walls. When only one set of regenerators is employed, the primary regulation of the air, as well as the draught on each oven, is effected by a single slide, which thus has to serve a dual purpose. It therefore follows that it is not possible to efficiently regulate the whole of the ovens in a battery, as while each oven would require practically the same quantity of air, there would be a variation in the draught of the oven according to whether the ovens are situated more remote from, or nearer to, the chimney, in which latter case, of course, the pull of the chimney would be the greater. The new system of regenerators enables both the quantity of air and the draught to be regulated with exactitude for each single oven, which is an advantage of great importance.

Until recently, the system of bye-product plant employed in connection with the Koppers coke-ovens was of the ordinary description, and such as is universally employed at all gas-works. About eighteen months ago, Herr Koppers conceived the idea of recovering the ammonia direct from the gas in the form of sulphate of ammonia, without the employment of a water scrubbing process. A system having the same object in view, and known as the Brunk principle, was brought out a number of years ago. In this system, the foul gases coming from the ovens were conducted directly into a sulphuric acid bath. But the system proved unworkable owing to the salt being contaminated with tar

and organic matter, and owing to the tar being detrimentally affected by passing through the acid. To overcome the difficulty which was experienced in this system, Herr Koppers cooled the gases down to the ordinary temperature for condensing the ammoniacal liquor and tar, and then conducted them into an acid bath after passing them through a superheater. The superheating enables the gas to be passed into the acid bath without condensation taking place, and even to evaporate the water released in the formation of the sulphate. This system has worked with the very greatest success; and though it is only within the last twelve months that the process has been put on the market, there are now five large plants in operation and six under construction—plants which together will deal with the gases from 900 ovens.

The advantages of the new system are numerous, and of a most important character. The main features are the simplicity in the design of the plant, the reduction in the amount of water necessary, the reduction in the quantity of effluent by one-half, the reduction in the consumption of steam, increased yield of ammonia, and less wear and tear on the plant.

Professor E. J. Constam, Head of the Federal Fuel-Testing Laboratory at Zürich, submitted a paper, of which the following is an abstract, on the

DETERMINATION OF THE AMOUNT OF VOLATILE MATTER IN SOLID FUELS.

The amount of the volatile matter in, or the gaseous content of, coals, by which the different varieties of coal are distinguished in regard to their technical applicability, is calculated from the amount of coke yielded by, and the ash and moisture contained in, average samples of the fuels in question.

Different methods of determining the yield of coke are used in different countries; and from one and the same sample different values are thus obtained for the proportion of volatile matter. Consequently, in districts in particular where coal from different places of origin is used, the need of a uniform method of determining the yield of coke is imperatively felt. The author and his collaborateurs have therefore investigated the methods of Rougeot, Schläpfer, Streit, and Kolbe, the crucible methods of Hinrichs, Muck, Mahler, Goutal, and Finkener, and the Belgian, American, and Bochum methods of determining the quantity, chemical composition, and calorific power of the coke produced.

The yields of coke found by these methods, and the chemical and calorific properties of the coke formed in the crucible, were compared with the coke formed from the same fuels by distillation at 830° C. in a small gas-retort. The composition and the calorific power of the combustible substance in these retort cokes proved to be very similar to those of the cokes produced on gas-works and in ovens, after the ash and moisture were deducted from the coke. These relations are indicated by tables and curves which have been drawn up. Pyrometric determinations showed that different temperatures prevailed in the different coking methods in which the crucible was used. Further, it was established that no portion of the coke was burnt in coking by either the Bochum or the American method. When, however, the younger fossil substances, such as lignite and peat, and wood, are coked, the samples ought to have been previously air-dried, pressed into tablets, and then carbonized and cooled to the temperature of the room in a current of hydrogen, carbonic acid, or nitrogen.

The experimental results obtained lead to the conclusion that the differences in the yield of coke by the various methods are primarily due to more or less thorough carbonization of the fuels. The chemical composition of the coke produced in a crucible from coals is not affected by the composition of the original coal, but depends only on the temperature and the duration of the heating. The crucible coke produced according to Finkener's method at 700° C. resembles coal more closely than the cokes obtained at 900° to 910° C. according to the Bochum or the American method. The latter approach nearest in composition and calorific power to the cokes formed on the large scale in gas-works and in coke-ovens. The slower rise of, and the lower final temperature in, dull platinum crucibles cause the yield of coke to be greater in them than in polished crucibles.

Notwithstanding the contentions of Hinrichsen and Taczak, and of Geipert, to the contrary, the author is of opinion that it is not possible to find a crucible coking method which will afford the same yield of coke as different working methods, which, indeed, differ between themselves. On the other hand, the author would prescribe as a standard method one which gives a coke most closely resembling in composition and calorific power the gas and oven coke. Such a method is the American one, which is convenient to carry out, is applicable to all solid fuels (including those which carbonize without luminous flames), and affords very closely concordant results in parallel tests. As this method is already in general use in those countries—viz., the United States of America and Great Britain—which produce the most coal, it appears to the author that its general adoption is desirable in all conclusive analyses of fuels.

The results of the examination are only comparable for different coals if they are referred to the coal or coke free from moisture and ash. The author therefore proposes in general to take for the volatile matter in a fuel—referred to the dry and ash-free substance—the figure obtained by subtracting from 100 the yield of coke as determined by coking 1 gramme of the fuel in a polished platinum crucible according to the prescription of the American Committee on Coal Analysis. This prescription is as follows: "One gramme of the fresh, undried powdered coal is heated for 7 minutes over the full flame of a bunsen burner in a platinum crucible weighing 20 to 30 grammes, and provided with a tightly fitting cover. The bottom of the crucible, which is supported on a platinum triangle, should be from 6 to 8 cm. above the top of the burner. The flame when burning free should be 20 cm. high; and care should be taken to protect it from draughts during the determination. The under surface of the cover should remain coated with carbon; but the upper surface should always keep free from it."

Analyses for arbitration purposes made in different places by this method on the same sample show differences for the most part of less than 1 per cent. in the yield of coke, and only rarely of as much as 2 per cent.

UPWARD FILTRATION OF WATER.

In September, 1907, an experimental filter of the upward type, which had previously been tested with Mississippi River water near St. Louis, was installed at the Jerome Park reservoir, New York. It was operated continuously under the direction of Mr. John C. Sparks until quite recently, when Dr. Walter Bensel, the Sanitary Superintendent of the Department of Health of the city, began a six weeks' test of the plant. The Department of Water Supply, Gas, and Electricity has also had an opportunity of examining the operation of the system. This filter uses Croton River water, which tests conducted by this department have shown to be exceptionally easy to purify. Another experimental plant has been constructed at Niagara Falls, using the water of the Niagara River, which is not so easily filtered as the Croton supply. Examinations of the operations of this filter have been made by Dr. Lederle, of the State Water Supply Commission, and also by Mr. Sparks; and the following account of them has been given in "Engineering Record."

The filter at the Jerome Park reservoir is a reinforced concrete structure about 21 ft. by 27 ft. 6 in. in plan and 10 feet high. It consists of an outer box or container and an inner chamber about 15 ft. by 20 ft. 6 in., which holds the filter. The inner chamber has walls of concrete 4 inches thick, reinforced with 3 in. by 12 in. wire mesh, having ⅜-inch wire. The filtering material is supported by a row of thin boards. The chamber is supported by four 12 in. by 8 in. concrete beams, reinforced with 1-inch rods. The beams rest upon piers 12 inches high, so that between the lower edges of the box and the floor of the container there is a clear space of 24 inches on the ends and 12 inches on the sides.

The method of operating the filter consists essentially in flooding the space between the outer and inner compartments with raw water. This flows downward, underneath the bottom edges of the inner box and up through the filtering material. The filtered water collects on top of the sand in the inner chamber, and is carried off through piping. The difference in elevation between the top surfaces of the raw and filtered water is stated to be generally about 8 or 10 inches. One of the strongest claims made for this system of operation is that the head required for operation is small in comparison with that considered necessary for the satisfactory operation of sand and mechanical filters.

The inner chamber, near its bottom, is fitted with a screen of thin boards, laid at an angle of 45° to the horizontal. These not only support the filtering material, but also intercept any coarse suspended substances in the raw water. Above the boards is a layer of galvanized wire netting, No. 8 mesh, over which is spread a 7-inch layer of screened charcoal. This is covered with copper wire netting, No. 30 mesh, and a layer of sand 20 inches deep.

The raw water is taken direct from the reservoir and admitted to the filter through a pipe provided with a ball-cock regulator. The channel between the inner and outer chamber is stated to have some efficiency as a settling-basin, and a blow-off is provided in the bottom of the tank for the removal of the sediment. At the top there is an overflow-pipe connecting with the sewer.

The filter is operated at the rate of about 15 million gallons per acre daily—being 50 per cent. higher than the rate adopted by Mr. de Varona in the preparation of his plans for the filters at the Jerome Park reservoir—and is cleaned at periods varying between two weeks and several months, depending upon the condition of the water. The average bacterial removal by the filter since it was brought into operation is said to have been 99·2 per cent., and that of the Niagara Falls filter 99·6 per cent. To clean the bed, the inlet-valve is closed and the blow-off opened; thereby emptying the outer tank very quickly. The filtered water on top of the sand flows back through the bed, washing the clogging material into the blow-off pipe. An advantage claimed for the filter is that it is always cleansed with filtered water. The process occupies very little time, and can be repeated as often as necessary until the discharge-pipe gives a clear effluent.

Creosoted piles driven on the Louisville and Nashville Railway in sea water in 1882 are still in service, though it has been necessary to protect a considerable number of them by casings of cement or vitrified pipe, on account of the damage done by the teredo.

VERTICAL FURNACES,

AND THE EXPERIENCE WITH THEM TO PRESENT DATE.

By E. Körting, of Berlin.

The introduction of the vertical furnaces into gas-works practice, and the demands made upon the staff for their supervision, have vividly reminded the author of the days in the seventies and eighties when generator furnaces were first introduced and tried. The generator furnace represented nothing less than the transformation of the old mechanical rule-of-thumb into scientific retort-house practice. Whereas, in the good old days, there was nothing to do beyond seeing that the stokers carried out the manipulation which time had shown to be the best, the management of generators, on the other hand, demanded of engineers and chemists careful observation of the following points:—

1.—The regulation of the primary air.
2.—The regulation of the secondary air.
3.—The observation and regulation of the draught.
4.—The observation of the influence of points 1, 2, and 3 upon the other.
5.—Control of the combustion and production of gas in the generator.
   (*a*) Height of the fuel.
   (*b*) Timely clinkering.
   (*c*) Influencing the formation of clinker and gases by appropriate steaming.
6.—Correct mixing of generator gas and secondary air in the furnace.
   (*a*) Equal subdivision of the heat.
   (*b*) Avoidance of too sudden combustion (blow flame).
   (*c*) Provision of heat-resisting fire-clay material for the hottest parts.
7.—Observation of the composition of the furnace gases, with reference to:
   (*a*) Setting the dampers.
   (*b*) Gas-tightness of the regeneration.
8.—Construction of the generator and the regeneration in such a manner that imperviousness and durability are insured and mutually detrimental influences avoided.

The above recapitulation shows that the problem to be solved was a many-sided and complicated one. It is not to be wondered at that years of trial were necessary, and that a great number of failures, faulty constructions, overheated and melted retorts, pervious and useless regeneration, &c., were registered before good and generally satisfactory solutions could be found, and that the generator furnaces made great calls on the perseverance and intelligence of the works' engineers, furnace builders, and retort-house foremen, especially as the mistakes and imperfections in the furnaces are as a rule not noticeable at first, but only in the course of months or even years.

The Dessau vertical furnaces, like the generators, have set fresh tasks on the staff of the gas-works. If, however, the question is carefully considered, it will be seen that the extra work and the greater responsibility are insignificant when compared with the leap from fire-bar to generator furnaces. The main principle of the Dessau vertical furnace lies in the fact that, while making full economical use of the furnace, a temperature is kept up in the lower zone of the retort which approaches the permissible limit of heat in regard to the retort's durability. From this the following conclusions may be arrived at:

1.—The temperature of the furnace must not exceed a certain maximum, but must be kept at a regular and equal height.
2.—This high temperature must be distributed equally in the lowest zone of the furnace, and in every flue of every furnace.

It may be seen that the new supplementary tasks are not heavy ones; but as neglect of them would endanger the furnace, a certain amount of care is imperative. The means to be employed in order to cope with No. 1 are as simple as they are effective. The furnace draught is kept constant, as well as the openings for secondary air; and those for primary air are regulated from one clinkering of the generator to the other, so that the chimney gases have their proper composition—a maximum of carbonic acid and a minimum of oxygen.

The problem of dealing with No. 2 is also easy to solve, as with vertical furnaces the carbonic oxide holes are all placed parallel to one another, and may be observed and regulated from the front of the furnace; whereas in the case of generators, they are one behind the other, and almost beyond the reach of control. In view of the high temperatures which vertical retorts are subjected to, and the danger of the furnaces which would ensue should this be exceeded, the works engineer or foreman must not rely on his eye alone in judging the temperature, but must have scientific instruments to assist him—the Wanner pyrometer for occasional, and Seeger cones for constant, control. The writer makes a point of recommending that the Seeger cones should be exchanged for new ones every fourteen days or three weeks.

When once the staff have become accustomed to carry out the regulating as in No. 1 regularly, and the inspection necessary to No. 2 of all the flues several times a day in a reliable manner, there will be found to be no difficulty in managing the vertical furnaces. It cannot, of course, be denied, and should indeed be emphasized here, that on some gas-works a number of furnaces or retorts have become defective through overheating in a few days in consequence of careless supervision. Everywhere, however, where proper care has been exercised, the results have hitherto been most satisfactory. For instance, the installation at Oberspree has been working since Feb. 1, 1907, without interruption, and without any marked diminution of the sliding qualities of the retorts. The Mariendorf retorts have been working uninterruptedly since Oct. 1, 1907, and are in absolutely good condition—that is, each separate retort empties itself automatically of the first charge after scurfing. The rough surface of the retorts causes then at times some sticking of the charge. There are no visible signs showing that the furnaces are likely to require any repairs for some time. This should be sufficient testimony to the ample durability of the furnace.

The opinion of the writer on this point is shared by such distinguished experts as Herr Prenger, of Cologne, and Herr Weiss, of Zurich, who, on being questioned in the matter, replied as follows:—

Cologne Gas, Electricity, and Water Works.

Dear Mr. Körting,—The vertical furnaces of the Cologne Gas-Works have been working very satisfactorily. Of the 24 furnaces, 12 have been constantly in action since June, and 12 since August, 1907. As these furnaces are just sufficient to cope with the summer requirements of our works, I propose to keep them in action until the latter end of the summer, and then, after about 900 days under fire, to renew the lower part of the retorts in the case of some furnaces.

During the last period of scurfing, I caused a thorough examination of the retorts to be made by Dr. Leise, which gave a satisfactory result generally. There was no serious damage to the retorts, such as might have made it necessary to let some of them down. Of the 240 retorts which comprise our installation, only 14 showed signs of wear in places on the narrow side of the lower parts, and contraction at the joints, thereby occasioning the sticking of the charge, especially after the retorts had been freshly scurfed. I put this down partly to overheating at the first period of working, when the staff were not yet fully acquainted with the new type of furnace. With adequate and technically able working management, I consider the durability of the retorts as thoroughly good and in every way satisfactory.

(Signed) H. Prenger.

Zurich Town Gas-Works.

Dear Mr. Körting,—The question of the estimated durability of the Dessau vertical furnaces was repeatedly brought up when our vertical furnace installation was erected, and a guarantee was required of the Dessau Vertical Company, corresponding to the claims of the constructors (the Stettin Chamotte Factory). It is well known that the durability of retort-furnaces in general is not dependent on the system of furnace and quality of the fire-clay material alone, but in a very marked degree on the proper handling of the furnace in respect to temperature, &c. On these grounds, the fire-clay manufacturers do not care to give guarantees, as it is naturally very difficult, and not always possible, to find out through what causes the retorts of a furnace have suffered. We have in our works—that is, in the earlier works, where furnaces with horizontal retorts were built—sufficiently proved by experience that the life of such a furnace could be lengthened or shortened according to the right or wrong way it was treated.

We have had especially favourable results, as may be seen from our yearly reports, on our gas-works at Schlieren-Zurich with the Coze furnace installation, as these furnaces, thanks to the good quality of the material and proper treatment of the furnaces, were able to show a duration of from 1350 to 2000 working days. The latter figure may be considered abnormally high, and attained only in the rarest cases. In general, a duration of 1000 days is a satisfactory result for a retort.

As is well known, the temperature in vertical furnaces, at least in the lower part of the retorts, is from 200° to 300° C. higher than in furnaces with horizontal and inclined retorts. Hence a certain mistrust in regard to the duration of the life of the vertical furnaces, because fire-clay material begins to get soft and liquid at a temperature of 1400° C. and beyond, and, consequently, endangers the durability of the furnace.

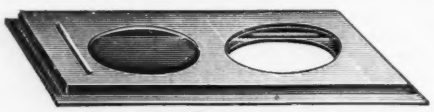
Vertical furnaces, consequently, require an especially careful treatment and daily observance, and the Vertical Furnace Company have given what was in fact a not very high guarantee (500 days) as to the durability of our furnaces, which, however, has now expired. Our vertical retorts have done very well, and show up to the present no deformation; whereas with our Coze furnaces, notwithstanding their aforementioned great durability, depressions of from 25 to 30 mm. were often observed in this short period. Small cracks which occur in vertical, as well as horizontal and inclined retorts, have to be filled up, after scurfing, with fire-clay mortar. We confidently hope to keep our vertical retorts in action for another one-and-a-half years, so that they show 1000 to 1200 working days. Should, contrary to our expectations, the life of these retorts not reach 1000 days, it would only be a matter of repairing the lower part of the retorts, which would take but little time and material, and cost comparatively little money. The remaining technical and economical advantages of the vertical furnace installation are such that we should be perfectly satisfied even with a shorter duration of the retorts.

(Signed) A. Weiss.

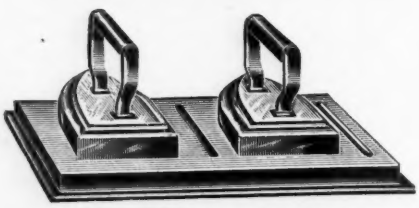
Books Received.—We have received from John Wiley and Sons, of New York, through Messrs. Chapman and Hall, "Gas-Engine Theory and Design," by Mr. A. C. Mehrtens, Instructor in Mechanical Engineering in the Engineering School of the Michigan Agricultural College. We have also received from Messrs. Stevens and Sons, Limited, of Chancery Lane, "The Law of Private Railway Sidings and Private Traders' Traffic," by Mr. John H. Cockburn, author of "The Law of Coal, Coal Mining, and the Coal Trade." We hope to notice both books more fully in early issues of the "Journal."

A GAS ECONOMIZER.

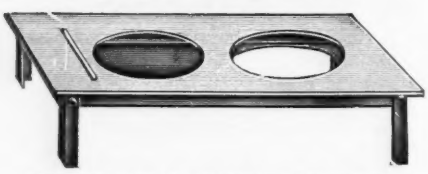
THERE is a mistaken notion abroad that appliances which produce an economy in the consumption of gas are regarded by gas suppliers as detrimental to their interests. The contrary, our ordinary readers need not be told, is the fact. In the gas industry, economy in gas consumption is synonymous with popularity; and suppliers are ever alive to this. In our "Register of Patents" last week, there was brief mention of a patent for a cheap form of economizer for use on the top plates of cooking-stoves or over boiling-rings; the patentee being Mr. W. May. The article is already on the market; and many consumers who have had it brought to their notice by the agents have adopted it. Mr. H. R. Hammond, one of the agents (of 5, Matham Grove, East Dulwich), has introduced a sample to us. The one for use on the top of a gas-cooker is in the form of a shallow tray with, in the bottom, a central circular opening, and at top a couple of circular openings.



The New Economizer.



The Economizer Heating Flat Irons.



The Economizer for Independent Boiler-Ring.

If this tray is placed over one of the boiling-rings of the gas-stove, the effect is to deflect the flame to the two openings in the top, and thus two saucepans, a kettle and a saucepan, or a saucepan and a frying-pan—in fact, any vessels that require heating—can be used over the same ring simultaneously. It is an all too common thing, under ordinary conditions, to go into a kitchen and see a saucepan or kettle on the top of a cooking-stove, with the flames wasting away all round it. This is uneconomical—and sometimes unpleasant. With this small and inexpensive invention, however, the heat otherwise wasted can be profitably utilized. Of course, this adjunct to the cooking-stove can be employed for the heating of two flat-irons. The same arrangement is equipped with legs, so that it can be used with an independent boiling-ring.

FLUELESS GAS-STOVES IN WORKROOMS.

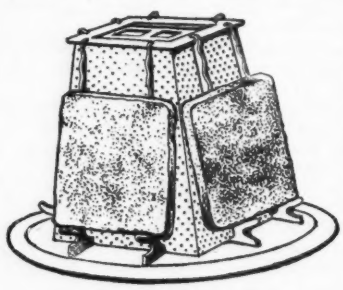
THE Annual Report of the Chief Inspector of Factories (Dr. Arthur Whitelegge, C.B.), issued last Thursday, giving details of the work carried out by the various inspectors under his supervision in the year ended Dec. 31 last, contains the following remarks on the use of flueless gas-stoves in workrooms.

The requirement of section 6 of the Act of 1901, that adequate measures shall be taken for securing and maintaining a reasonable temperature in each room in which any person is employed, and that the measures so taken must not interfere with the purity of the air in the room, has again given rise to much discussion between the inspectors and the makers and users of flueless stoves. In view of the terms of the section, the Department cannot regard the provision of stoves which discharge the products of combustion into the room as compliance with the requirement. It has been contended that they are no worse than unventilated gas-burners for lighting, which the Act does not forbid; that their yield of carbonic acid and water vapour is only akin to that of respiration; and that no poisoning, or large proportion of carbonic oxide, has been demonstrated to attend the use of certain stoves of the kind. In some instances, analyses have been produced tending to show that, contrary to the usual experience, the products of combustion of gas contained no sulphur compounds, carbonic oxide, or organic matter.

The section was intended to prevent an abuse which was found not to be remediable under the older Acts—viz., the "warming" of workrooms, even in daylight, by means of unventilated gas-jets normally used for lighting purposes only. The objection to this is not removed by burning the gas on a larger scale, and still without local ventilation, in stoves instead of brackets or pendants. The criterion established by the section is the avoidance not merely of poisoning, but of additional pollution of the air by the products of combustion. Beyond this, the section does not limit the choice among the various means of warming. But as compared with open fires flueless stoves have a double disadvantage. They fail to contribute to ventilation, and they increase the need for it. If, therefore, they were admissible as means of complying with section 6, a higher standard of ventilation would be required.

GAS TOASTING APPLIANCES.

THOSE who are fond of toast (and who is not?), and at the same time possess among their kitchen arrangements the luxury of a gas-cooker, are being catered for by means of two very unassuming little appliances which have been introduced on the market by the Elbard Stove Company, of No. 108, Queen Victoria Street, E.C. The larger of these—the "Rapid" gas-toaster—is shown in the accompanying illustration; and it is so simple that hardly any more explanation of it is called for. As will be seen, it is four-sided; and each side is provided with a rest, on which a slice of bread can be placed—the whole standing on a broad circular rim. Thus four pieces of toast can be simultaneously prepared (and in a remarkably short space of time); while the flat top can, during the process, doubtless be also employed for the heating of a small vessel, if desired. The sides are perforated all over; and within the appliance, placed crosswise, is a plate which serves effectually to deflect the heat in the first instance to just the part where it is required for the operation of nice, even toasting. All that is needed is to stand the toaster over the lighted ring-burner, place four slices of bread on the rests, and wait for results—which will not be long arriving. The contrivance is strongly made of sheet steel, and of British manufacture; and among its advantages, the extremely moderate price at which it is sold may fairly be included. The second pattern—named the "Handy"—is still cheaper, and is intended to make only one piece of toast at a time; the bread being laid flat upon bars which are fitted on top of a perforated plate. These little toasters, of course, constitute only a small item in a well-stocked kitchen; but they must not be passed over for that reason—in fact, nowadays nothing must be passed over that can be utilized to usefully consume gas. The grilling burners of a gas-cooker are not a really satisfactory method of making toast; and observation suggests that they cannot be so economical for this purpose as the placing of the "Rapid" toaster over one of the ring-burners. The possession of a toaster may therefore lead to gas being used in the making of toast much more frequently than would otherwise be the case; and if this should prove to be so, the appliances will be a boon to both the suppliers of the gas and the users of the cookers. It should be pointed out that they can also be employed in connection with a gas-ring, with which toasting would otherwise be practically out of the question.



The "Rapid" Toaster.

Professor Ira Remsen, President of Johns Hopkins University, Baltimore (U.S.A.), has been elected President of the Society of Chemical Industry for the ensuing year; and the invitation of the Scottish section to hold the next annual meeting in Glasgow has been accepted.

The stirring of chemicals in the solution tanks of the Oberlin (Ohio) water-softening plant is accomplished by the use of power furnished by a Pelton water-wheel. The wheel is 12 inches in diameter, operates under a pressure of from 9 lbs. to 22 lbs. per square inch, and consumes about 50 gallons of water per minute. The wheel drives a main shaft, to which the stirrers, or revolving arms, are belted. The waste water from the wheel is used for preparing the lime solution. The speed of the wheel is 180 revolutions per minute; those of the lime and soda agitators being respectively 38 and 13 revolutions per minute.

Water-hammer in some of the large mains of the Detroit Water-Works has been materially reduced by the use of an air-chamber, according to the annual report of Mr. George H. Fenkell, the Engineer of the Water Board. The direct pumping system is used. About half-a-mile from the station an emergency station has been built and equipped with a 1000 cubic feet air-chamber, an electric motor and air compressor, and other apparatus. This chamber is connected to two 42-inch force-mains, and since it was installed the pressure-gauges on a 24-inch connecting-main a few miles distant have shown a reduction in the ordinary water-hammer from about 12 lbs. to 3 lbs., while the hammer on one of the 42-inch mains with which the chamber is directly connected has been reduced from 10 lbs. to 4 lbs.

ELECTROLYSIS OF WATER-MAINS.

Damage to portions of the water-works of New Bedford (Mass.) by electrolysis has been recently investigated by Mr. W. E. Foss, of Boston; and his conclusions are given in detail in the report of the Massachusetts Water Board for the past year. They are summarized in a recent number of "Engineering Record," from which the following particulars are taken.

The water-works have about 110 miles of cast-iron distributing mains, from 4 to 36 inches diameter, laid with lead joints, a riveted steel force-main about eight miles in length and 48 inches in diameter, and 75 miles of lead service-pipes about $\frac{5}{8}$ inch in diameter. Water is pumped to the city reservoir through the 48-inch main, and delivered from it by gravity through a 36-inch cast-iron supply-pipe. The investigations showed that the return currents of the Old Colony Street Railway were a source of great danger to the large steel main—the only means of conveying water from the source of supply to the city; so that any damage to it which would shut off the supply would be attended with very serious consequences. For about three miles of its length, the force-main runs parallel to, and comparatively near, the railway line, and crosses it at one point. Water-pipes in an area located within about half-a-mile from the railway power station were found to be pitted to depths of from 5 to 15 per cent. of the thickness of the metal where the ground was comparatively dry. In wet ground, however, the disintegration in some spots extended entirely through the pipes. A 2-inch service-pipe leading from the 48-inch main to the engineer's house near the pumping-station has been renewed five times on account of damage from electrolysis. Tests on the service-pipe disclosed the fact that it was positive to the rails by as much as 45 volts at times, and that a current of several amperes flowed from it to the rails. At the intersection of the railway line and the steel main, the latter was positive to the rails by some 25 volts; and an examination of it at this point showed that electrolytic corrosion had taken place.

These conditions are stated to be due entirely to the operation of the street railway with insulated return conductors. The road-bed and foundations are stated by Mr. Foss to be poor, the rails light, and the cars heavy—a combination of circumstances which renders it difficult to maintain the rail-bonding in proper condition. Except for a very small part of their length, the rails are not reinforced with supplementary copper cables, while the location of the power station, about nine miles from the end of the line, would cause an unusually large fall of potential in the return conductors, even if these were of ample size and well bonded. The return drop in three miles of the railway line was 38 volts; so that on this basis the total drop for the whole nine miles would be upwards of 100 volts. The conductivity of both the steel main and the return system of the railway were tested. The pipe showed a conductivity seven times greater than that of the rails. The rails used weighed 60 lbs. per yard.

Mr. Foss states that the unusually large return drop could readily be reduced by 30 per cent., or to 70 volts, by feeding current for operating the cars from each end of the line instead of from one end only, as is now the case. A further reduction of about 50 per cent. in the remaining return drop would be obtained by relaying the track with 100-lb. rails instead of the 60-lb. rails now in use, and thoroughly bonding the joints. This would lower the drop to about 35 volts. A further reduction to only 10 or 15 volts could be effected by installing a booster in the line about four miles from one of its ends.

Periodic testing and examination of the rail bonding and drainage connections after the necessary repairs have been made are strongly recommended; and all the return cables should be thorougly insulated from the ground. Insulated copper cables should be run from the power station to several points in the vicinity; in order to minimize the electrolytic corrosion which is now taking place in the neighbourhood. Metallic connection between the steel pipe and the cover sheaths of the telephone cables is advocated, so as to bring them to the same potential. In fact, anything that can be accomplished to reduce the excessive fall of potential on the return circuit of the railway line would, it is stated, work to good advantage in preventing the destruction of the 48-inch main by electrolytic action.

FAILURE OF TWO WATER-TANKS.

A recent issue of "Engineering Record" contained particulars of the failure of two iron water-tanks, each 65 feet in diameter and 40 feet high, and of about a million gallons capacity, at Parkersburg (W.Va.). They were located side by side, separated by a distance of about 11 feet, upon Prospect Hill, in a rather populous district of the city, and formed part of the water supply system. They were built upon a concrete foundation, which was covered by a $\frac{3}{8}$-in. double-riveted bottom plate, to which the tank walls were attached around the circumference by means of a 4-in. by 4-in. by $\frac{3}{4}$-in. angle-iron with 1-in. rivets through the leg attached to the walls, and $\frac{3}{4}$-in. rivets through the leg attached to the bottom plate. A course of stone was laid round the bottom. Each tank was built with 10 plates, each 4 feet wide, with thicknesses varying from the bottom upwards from 3-4ths to 3-16ths inch; the top 12 feet being of the minimum thickness. Both tanks were constructed about 1885. The two tanks evidently failed within a minute of each other, since testimony is quite general that there were two distinct reports within this period. These were followed by noise due to the rushing water, to falling trees, and the wrecking of buildings. The destruction of the tanks and the consequent release of about 2 million gallons of water wrecked two buildings—one a church, and the other a large residence—and seriously damaged some fifteen other residences. Two people were killed and three or four seriously injured. The damage in all is estimated at about $50,000.

An examination of the wreck showed that both tanks were ripped along a vertical line. The wall of the southernmost of the two tanks was flattened out in a single piece with its outside up, about 75 feet from its former base. The bottom edge, which had been riveted to the base-plate, lay away from the foundation. The wall of the other tank was torn into two pieces; the nearest end of both lying 50 to 60 feet to the north of the base. The smaller of the pieces lay with its inside upwards and its bottom edge towards the tank; while the larger sheet had been twisted through a 180° angle, lying in part with its outside and in part with its inside upwards. There were indications that the tank to the north failed first—an old crack, about 3 feet long, being disclosed in the angle at one of the vertical ripped ends—and that in flying outward the free end was thrown against the other tank, which failed as a result of the blow. That this was probable was indicated from the fact that if a line was swung round, unrolling from the circumference of the northern tank, beginning at the point of rupture, it would strike the other tank at the point where the failure seemed to have occurred.

The tanks separated from the foundations by tearing along the line of $\frac{3}{4}$-in. rivets holding the angle to the foundation-plate. Along the line of failure of the south tank, six of the sheets were torn through; two of the sheets parted along the vertical rivet line; and the ends of the other two sheets were turned under, so that they could not be readily examined. Seven of the sheets of the north tank were torn; two parted along the line of rivets; and one was in part torn and in part failed along the rivet line. None of the rivets, either in the tank walls or in the bottom, were broken.

There were no unusual conditions at the time of the accident, though there was a light rain shortly before. Since the minimum temperature during the night was 50° Fahr., and there had been no severe weather during the previous day, it was not thought that there was any ice in either tank. Moreover, no indications of ice were discovered after the accident. There was very little wind at the time. The superintendent of the water-works states that he never saw any indication of leaks in either tank, and that they seemed to be in good condition. Though a number of people passed near them the day previous to the accident, no leaks or signs of failure were noticed.

Illuminants and Illumination.—A paper was recently read before the Birmingham and District Electric Club, by Mr. W. Smith, on "Illumination." In comparing different illuminants, the author gave the comparative cost of lighting by oil, gas, and electricity as in the ratios of 1, 0·46 and 1·1 respectively—taking paraffin oil at 9d. per gallon, gas at 2s. 3d. per 1000 cubic feet, and electricity at 4d. per unit. In considering the amount of illumination required in rooms, he stated that 1 candle-foot was about sufficient to enable the average person to read with comfort; but a great deal depended on the colour and reflecting power of the decorations. In the course of some remarks upon workshop and exterior lighting, Mr. Smith referred to the glaring effects of powerful flame-arc lamps outside shops, and suggested that Mr. Lloyd-George might do worse than make these "blinding annoyances" a source of revenue. With reference to street lighting, he said that side streets should have something like 1-candle power per 200 square feet of ground area, but leading thoroughfares should be much more liberally supplied.

Reflection of Light from Rough Surfaces.—At a recent meeting of the Royal Dublin Society, Professor W. F. Barrett submitted a communication on methods of determining the amount of light irregularly reflected from rough surfaces. The law of inverse squares being inapplicable to such surfaces, the author has employed two methods, which are stated to yield satisfactory results. According to an abstract of his communication given in "Nature," a Lummer-Brodhun or other similar type of photometer is employed, and the intensity of the stronger light is reduced by (1) a rapidly revolving opaque disc having a sector cut out, the size of which can be accurately adjusted until a photometric balance is obtained; or (2) by an adaptation of the author's instrument for determining the "light-threshold" of the eye. In this case the stronger light is reduced by absorption through a column of liquid of neutral tint; the length of the column being capable of easy and accurate adjustment. By this means measurements can be made of the light diffused at various angles from small surfaces, which are used to replace the silvered mirror that reflects the standard light through the liquid column. This arrangement also affords a convenient method of testing different systems of lighthouse illuminants.

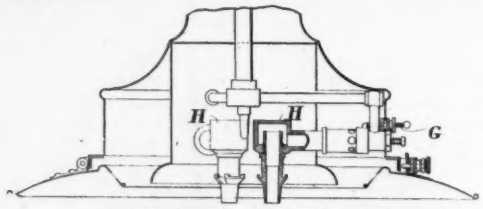
REGISTER OF PATENTS.

Incandescent Gas-Lamps.

WM. SUGG AND CO., LIMITED, and WRIGHT, E. S., of Regency Street, Westminster, S.W.

No. 15,644; July 23, 1908.

This invention relates to the burners of inverted incandescent gas-lamps provided with means for regulating the gas and air supplies from outside the lantern.



Sugg's Incandescent Gas-Lamp.

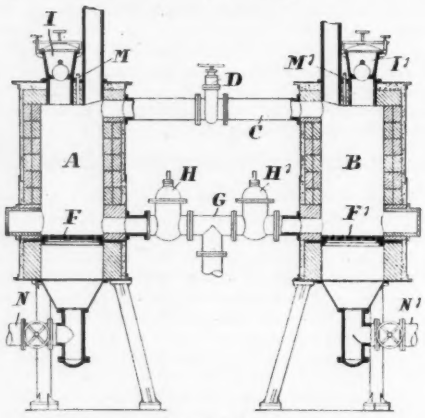
As shown, there are three horizontal branches from the gas supply pipe, turning at right angles to carry the burner-tubes, each of which has a screw needle valve and a hit-and-miss air adjustment—both accessible from outside the lantern—the latter by means of a screw G carried by the lantern. The burner-tubes have at their inner ends bulbs or chambers H, into which the gas and air mixture enters near the bottom. The inner ends of the burners extend into the bulbs some little distance beyond the inlet of the gas and air mixture, so that the latter has to deviate from its direct course and pass over the edge of the burners before entering them.

Obtaining Gas from Tar in Gas-Producer Plant.

RINCKER, F. G. C., and WOLTER, L., of Watergraafsmeer, near Amsterdam.

No. 10,422; May 13, 1908.

The essential feature of this invention is that the tar gas is produced in two alternately working generators. The tar which is conveyed through the glowing coal is first converted into gas in one generator, and then carried off through its own expansion; and the tar-vapours left in the generator are forced by a current of air conveyed from below into the second generator, from which, passing through glowing coal, they flow out in the form of gas—the first generator being simultaneously blown-up by the current of air carried through.



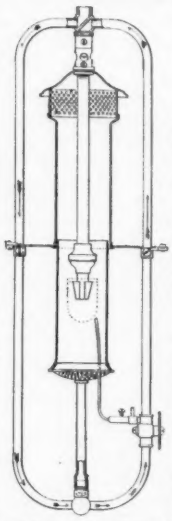
Rincker and Wolter's Tar-Gas Process.

The generators A B are of similar construction, and lined inside with fire-brick or the like. They are connected at the top by a pipe C, in which a valve D is inserted; and at the bottom near their fire-bars F F¹ by a pipe G, in which two valves H H¹ (independent of each other) are inserted. Each generator is, moreover, furnished with a feed hopper I I¹ for introducing the coal, with chimneys for carrying off the combustion gases, and with pipes M M¹ for introducing the tar. Pipes N N¹ are provided in the lowest part for introducing a current of air for the blowing-up of the generators.

The action of the apparatus is as follows: The valves H, H¹, D, those on the pipes N N¹, and the tar-pipes M M¹ are shut off and the valves in the chimney opened. The generators are filled with a quantity of wood, and to a certain height with coke, and a fire started in each. The valves on the pipes N N¹ are opened, and a current of air is introduced into the generators through these by means of a fan (not shown), whereby both generators are blown up, the fires started, and the required heat obtained. The combustion gases pass through the chimneys to the open air. When the fuel has acquired a certain temperature, the valves on the pipes N N¹, and those in the chimney pipes, are closed and the valve H opened. The tar is conveyed through the pipe M into the generator A and constantly comes into contact with fresh layers of glowing coal, is vaporized, and, at a maximum temperature, passes out as gas through its own expansion by way of the valve H and the pipe G. When the temperature in the generator A is so far reduced as not to be sufficient to form gas from the tar, the tar is stopped from entering it, and the necessary valves opened and closed, so that the current of air from the pipe N forces the tar vapours left in the generator A through the pipe C into the generator B. Passing through the glowing coal in it, the tar vapours are converted into gas and are carried off, as gas, through the valve H¹ and the pipe G. So soon as the gas formed by the action of the coke on the air has reached the valve H¹, the valve D is closed, so that the current of air passing into the generator A will act upon the fuel and resuscitate the fire to again establish the desired heat; and the products of combustion will pass away by the chimney. The valves are again manipulated so that the generator B is blown in by a current of air conveyed through the pipe N¹ to resuscitate the fire, which has been deadened by the generator being closed. The combustion gases again escape through the chimney; and when the fires have obtained the required degree of heat, a repetition of the operation takes place in the generator B.

The air, it is pointed out, is only used for creating or resuscitating the fire and forcing out the remaining vapours, and does not mix with the gas, which is said to burn "quite brightly when it leaves the generator, without being further treated, and has great calorific value."

Gas-Lamps with Inverted Mantles.



Podmore & Thomas's Insect-Proof Lamp.

PODMORE, A. E., of Herne Hill, S.W., and THOMAS, J., of Hanley Road, N.

No. 14,835; July 13, 1908.

The patentees propose to provide an incandescent gas-lamp with special arrangements for preventing flies and other insects from getting to the interior of the burner or on to the mantle—thus making the lamp especially suitable for use in hot climates.

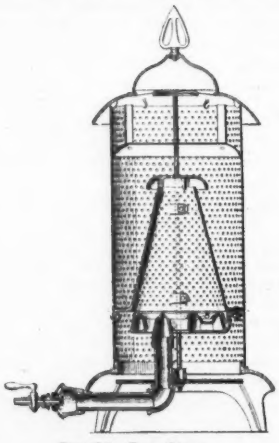
In carrying out the invention, they employ (as shown) an oval frame made of brass—a harp—which carries a circular metal enamelled plate about half-way between the top and bottom, and on which is mounted a metal chimney, terminated by a cap of perforated metal. Depending from the top portion of the harp is the burner, which passes down the interior of the metal chimney. A glass globe or chimney, surrounding the mantle and lower part of the burner, is supported at the bottom by a hollowed or saucer-shaped glass holder—made, preferably, of perforated metal; the concavity of the hollow being such as to concentrate the current of air passing through the perforations on to the lower part of the mantle. This holder is, in turn, supported by a short pillar, rising from the bottom part of the harp and made capable of removal by means of a cone and socket.

Gas-Stove.

BROCK, J. M., of Flushing, New York, U.S.A.

No. 18,941; Sept. 9, 1908. Date claimed under International Convention, Sept. 16, 1907.

This invention relates more particularly to gas-stoves "wherein a comparatively massive hollow reticulated body may be maintained in an incandescent state so as to emit both light and radiant heat by a relatively small burner and small consumption of gas."



Brock's Gas-Stove.

As shown, the hollow reticulated member forming the combustion chamber has a relatively small opening at its top and a relatively large one at its bottom, with a burner arranged to direct the flame into the combustion chamber so as to heat the member from the inside. The means include a diaphragm and an outer shell or casing for protecting the outer surface of the member from cold air; the shell being, in part at least, permeable to light. The diaphragm extends between the shell and member, and divides the shell into two compartments—one containing the member, and the other the burner, whereby the member may be maintained in a state of incandescence with a slight consumption of fuel.

An important feature of the invention resides in the provision of means for "perfecting and augmenting combustion," thereby serving the two-fold purpose, among others, "of greatly increasing the heating efficiency of the apparatus and consuming dangerous gases and eliminating disagreeable odours and other objectionable features incident to constructions of this character." This means comprises a hollow member which forms a combustion chamber, and is adapted to be

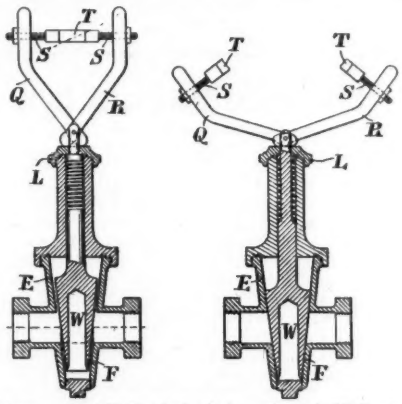
heated to incandescence. In the embodiment illustrated, this member is formed of metal, preferably cast iron, and is situated above the burner, where it is subjected to the heated air and products of combustion, which pass along its inner surface and heat it to incandescence. The incandescent member is made in the form of a hollow upwardly tapering member or cone. To bring it to a state of incandescence, it is perforated so as to secure more intimate contact of the flame and the heated gases with the heated member, and also to increase the area of the heated member with which the gases and flame come in contact.

Thermal Gas Cut-Off Device.

SCHWAGER, A. C., of New York, and HOLLANDER, J., of Boston, U.S.A.

No. 21,361; Oct. 9, 1908.

This invention relates to a device for shutting off the supply of gas to a house-meter and piping in case of fire, when the temperature rises to a point where it will melt a fusible element having a low melting point. It is especially adapted to cut off the supply of gas to a house-meter when the temperature rises high enough to melt the meter casing.



Schwager and Hollander's Automatic Cut-Off Device.

The illustration shows the valve in its open position, in which it is held by a pair of external levers and a co-acting fusible element; also when the valve is forced to its seat by the release of the external levers normally held under restraint by the fusible plug.

The cut-off device contains the usual tapered plug valve, working in a valve-casing, having a tapered seat, and generally in direct communication with the supply main and the meter. The inlet and outlet openings are connected by a passage which intersects the tapered seat of the casing—dividing the valve seat into two portions E and F. At the upper end the cylinder I is closed by a threaded cap. The valve-stem shown is of two diameters—the upper portion being reduced and being encircled in this instance by a strong coiled spring normally tending to close the valve, but held under restraint. The spring rests at its lower end against a shoulder on the valve-stem; at its upper end it bears against a packing-ring provided to prevent any escape of gas through the opening in which the valve-stem works.

The means suggested for holding the valve open consists of two external levers Q R pivoted to the upper end of the valve-stem and connected by a threaded bar S, consisting of two parts made of metal having a relatively high melting point, and a third (fusible) element T joining the two main parts—a piece of solder of the proper size and strength connecting the threaded portions of the bar, the ends of which have stop-nuts for holding the handles in position. The lower ends of the handles are formed in this case with curved cam-surfaces, which permit the valve-stem, and thereby the valve, to be readily raised.

The normal positions of the parts are first shown and then the positions of the parts in case of a fire, when the fusible element T has been melted. It will be noticed that the tapered plug gas-valve has been forced downward by the spring, and the tapered surface of the valve is in close contact with the co-acting tapered surfaces E F of its seat—cutting off communication between the main and the meter. The valve itself is bored out at W, for the double purpose of providing a space into which accumulations of hydrocarbons in the casing may be forced, and to enable the lower end of the valve to be tapered to a sharp edge, such as will assure its cutting through any accumulations and finding a positive seat when the spring is released. The normal positions of the parts first shown will remain unchanged until the connector T is melted, when (the force normally holding the valve open being removed) the spring comes into action and effects a positive closing of the valve to the position shown in the second view.

Burner-Tubes for Inverted Pressure-Gas Lamps.

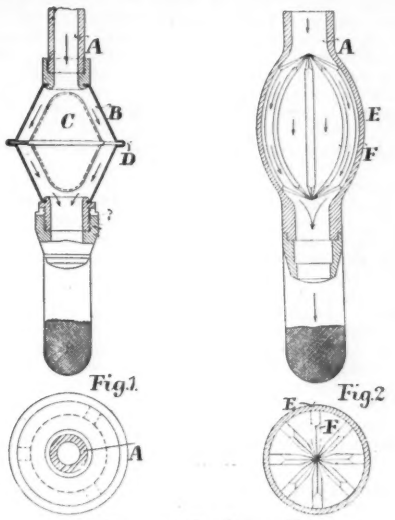
GRAETZ, M., of Berlin.

No. 23,830; Nov. 6, 1908.

This invention relates to preheaters used in the burner-tubes of incandescent inverted gas-lamps working with pressure gas.

In the case of pressure-gas lamps, the patentee points out, two great difficulties are encountered in the application of such preheaters. There is first of all the danger of back-firing; and, in the second place, there is the difficulty caused by the great expansion of the gas and air mixture under the heating action of the burnt gases. To avoid the danger of back-firing, he proposes to arrange the preheater directly above the burner-head, or in the lower part of the burner-tube, "so that a considerable column of comparatively cool mixture is above the preheater." In this way, the expansion of the mixture under heating does not materially affect the flow of the mixture in the column; so that the velocity of this flow of mixture, which is under pressure, remains greater than the velocity of the flame at back-firing. It has already been proposed to arrange a preheater near the burner-head in ordinary pressure lamps; but the arrangement involves the restriction of the passage of the mixture through the preheater in order to prevent back-firing. According to the present invention, far from restricting the passage, means are employed for preventing fluid frictional losses in the preheater.

These features are embodied in a preheater for inverted gas-lamps working with pressure fluid arranged in the lower part of the burner-tube, and in the form of a widened chamber containing a deflecting or division piece such that the mixture passing through the preheater is divided into thin streams, "which do not materially or suddenly depart from the original direction of flow."



Graetz Pressure-Gas Burner-Tubes.

In fig. 1, the burner-tube A has at its lower end fixed to it a widened part B of double conical form, and merging at its upper and lower ends into substantially the diameter of the burner-tube. Within the chamber there is supported a deflection or division piece C, which conforms substantially to the internal shape of the double conical chamber, and is formed with lugs which engage in a fold D on the chamber. The mixture passes downwards, as shown by the arrows, and, by means of the deflection piece, is divided into thin streams, which are heated by contact with the outer walls of the chamber B, which is heated by the hot gases rising from the burner. With this device it will be seen that the direction of flow of the gas receives no substantial or sudden change, and "thereby very little resistance is offered to the flow of the mixture."

In fig. 2 the burner-tube A is at its lower end widened into bulb-form, so as to form a preheater chamber E in which the deflecting piece F is arranged in the form of a spider composed of several radial arms, which meet in the centre. By means of this spider, the mixture passing from the burner-tube is, as before, divided into several thin streams, which are heated by contact with the exterior walls of the bulb E, and also by the arms of the spider. It will be seen that in this case the arms of the spiders are in metallic connection with the walls of the chamber E and thereby become heated, "so that with this construction a still greater heating surface for the mixture is obtained."

Manufacture of Gas.

LAKE, W. E.; a communication from the INTERNATIONAL GAS DEVELOPMENT COMPANY, of New York.

No. 20,014; Sept. 23, 1908.

The claim for this invention is for a process of manufacturing gas consisting of passing steam through a bed of hot coke to form water gas, passing the water gas up through powdered coal falling freely through a distilling chamber, and collecting the products.

An illustrated description of the process appeared in the "JOURNAL" for April 20 last, p. 152.

Treatment of Spent Oxide.

WILLIAMS, P. E., of Leytonstone, Essex.

No. 596; Jan. 9, 1909.

This invention has for object the treatment of spent iron oxide and like material containing sulphur "for the extraction therefrom, in an economical manner, of sulphur."

For this purpose, the spent oxide, or like material in the form of sulphide of iron with more or less free sulphur in admixture therewith (and whether previously subjected to a revivifying treatment or not), is treated in a closed vessel to the action of strong ammoniacal liquor, which is caused to circulate through it so as to extract the sulphur present and form therewith ammonium polysulphide, which is afterwards treated for the recovery of sulphur, and also, it may be, of the ammonia and any other gaseous or volatile matter present therein.

The spent material may be treated with the strong ammoniacal solution *in situ* in the purifiers, which, during the recovery of the sulphur, are disconnected from the other boxes in which purification is proceeding. Or the spent oxide may be removed, as usual, from the purifiers and exposed to the atmosphere in the ordinary way, so as to revivify the spent material and produce a mixture of oxide of iron and free sulphur. In this case, the mixture of oxide of iron and free sulphur is arranged preferably in layers on perforated trays or supports in a separate vessel,

the lower part of which is adapted to contain ammoniacal liquor. The oxide of iron may then be again converted into sulphide of iron by passing through it crude coal gas, or ammoniacal liquor containing sulphuretted hydrogen. In either case, the lower part of the vessel (or a separate vessel) is then charged with ammoniacal liquor through which coal gas or other gas rich in ammonia and sulphuretted hydrogen is caused to pass, as by a perforated pipe, or some other gas-washing apparatus is employed, to produce a strong ammoniacal liquor, which is then sprayed over the mixture of sulphide or oxide of iron and free sulphur, so that it circulates through the material until it is saturated with sulphur—the operation being, if necessary, repeated with additional strong ammoniacal liquor until practically the whole of the free sulphur is found to be removed from the material under treatment.

The resulting ammonium polysulphide thus obtained is then treated for the recovery of the sulphur. For this purpose, it may be heated to boiling point by steam in a suitable vessel (such as a still or boiler) to drive off the ammonia and any other gaseous or volatile matter present, and leave the sulphur, which may be recovered by filtering off the liquid and washing and drying the separated sulphur. The ammonia driven off during the treatment may be recovered for re-use, for which purpose, after cooling, it may be passed back into the stream of coal gas supplied to the vessel containing the ammoniacal liquor and spent oxide.

The gas rich in ammonia used for preparing the strong ammoniacal liquor, may be that leaving the exhauster used for withdrawing coal gas from the retorts; or where coal gas is being treated with ammonium polysulphide for the extraction of cyanogen therefrom, the gas leaving the cyanogen washer and containing ammonia and sulphuretted hydrogen may be passed through the ammoniacal liquor in the bottom of the vessel containing the material to be treated.

After removal of the free sulphur as described, the remaining material, consisting of sulphide of iron, can, after revivification and drying, be returned to a purifier for again absorbing sulphuretted hydrogen from the gas.

By means of the invention it is claimed that the sulphur required in gas-works for the production of ammonium polysulphide for purification or other purposes, "can be obtained in an economical manner from the coal gas produced in such works."

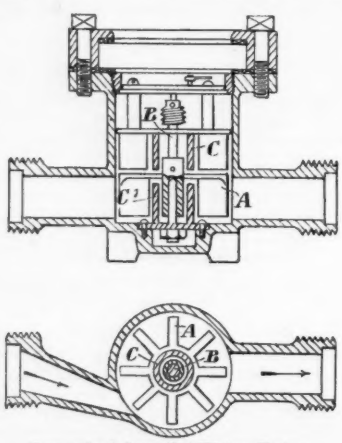
Rotary Inferential Water-Meters.

CREMER, R., of Leeds.

No. 746; Jan. 12, 1909.

This invention relates to turbine water-meters in which the water current is directed only against part of the circumference or along one side of the fan-wheel, thereby producing one-sided pressure on the latter.

In this class of meters, it has been heretofore proposed to provide an integral semicircular partition for confining the current in a channel within the water-chamber, so as to concentrate the flow on to the overhanging operating blades of the wheel; and the present invention is limited to turbine meters in which the main arbor has a direct drive and is immediately coupled to the spindle of the recorder.



Cremer's Inferential Water-Meter.

The illustration shows a vertical section of the meter, and a horizontal section through the circular water-chamber.

The fan-wheel A has its arbor B extended upward, and adapted to actuate the recording gear. For the purpose of preventing the pressure of the water-current from affecting the arbor, there are provided above and below (or between) the vanes of the wheel stationary screens C C¹ interposed between the wheel-hub and the water-current. If movable screens are employed instead of stationary ones, they must not turn simultaneously with the arbor.

Movable screens must not be directly or rigidly attached to the wheel-hub or the arbor, because they would practically become part of it, and so intensify the action of the water-current in the same manner as it occurs in an existing inferential water-meter. Therefore, the most reliable arrangement is that of stationary screens placed in proximity to the arbor within the inner circle of the wheel-blades.

APPLICATIONS FOR LETTERS PATENT.

11,604.—WANGEMANN, P., "Conveyance of incandescent coke." May 17.
11,639.—OSWALD, T. H. & T. H., JUN., "Suction or pressure gas plants." May 17.
11,675.—FARNHAM, R. V., "Gas-producer." May 18.
11,756.—GEORGE, J. R., "Gas-producers." May 18.
11,783.—LEA, J. W., and PERRINS, J. H., "Inverted burners." May 19.
11,785.—GUNN, G., "Preventing vibrations in pipes." May 19.
11,787.—THOMPSON, E., and SIMKINS, F. W., "Anti-dip gas-valve and hydraulic main." May 19.
11,800.—WILSON, K. R. M., "Apparatus for distilling coal." May 19.
11,801.—WARDALE, E. S., "Locking-devices for prepayment meters." May 19.
11,826.—BLAND, C. W., and GLOVER, T., "Regulating device for atmospheric burners." May 19.
11,890.—CROSSLEY, W. J., and RIGBY, T., "Gas-producer plants primarily designed for the recovery of ammonia." May 20.
11,901.—BÖHM, E. & R., "Imitation candles for gas." May 20.
11,925.—BUCKLAND, J., "Gas-economizer for stoves." May 20.
11,941.—ROBIN, J. I., "Cases for mantles." May 20.
11,942.—ROBIN, J. I., "Manufacture of mantles." May 20.
12,004.—HANSEN, E. D., and WINKLER, G. F. C., "Separating gas from liquid." May 21.
12,033.—TYLOR, H. E., "Locking gas-taps." May 21.
12,049.—ZECHNALL, L., "Inverted burners." May 21.
12,088.—PITT-PAYNE, W., "Gas-fires." May 22.
12,090.—THORP, T., "Bye-pass for gas-meters." May 22.
12,098.—HEATH, E., "Meter." May 22.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Livesey Memorial Fund.

SIR,—In revising the complete list to date of the above fund, I have to ask you to kindly note that I find two errors have unfortunately crept in—viz., the Newark Gas Company's subscription of £5 5s. has been entered twice (on Jan. 18 and Feb. 24); and that of Mr. W. E. Price, of Hampton Wick, £2 2s., twice (on March 12 and April 3). This reduces by £7 7s. the total amount announced.

W. T. DUNN, Secretary,
Institution of Gas Engineers.

39, *Victoria Street, S.W.*,
May 28, 1909.

The Local Government Board Audits and the South Metropolitan Gas Company.

SIR,—The letter of the Chairman of the South Metropolitan Gas Company in the "JOURNAL" for the 25th inst. just reaches us (the 28th); and your Whitsuntide issue goes to press early to-morrow. We write from Eastbourne, and must defer fuller reply with the documents before us.

Meantime, we may say that we did not tax your columns with the Woolwich report in addition to Bermondsey—

(1) For the manifest reason that we were in ignorance of that report at the time, a copy having only since reached us.
(2) The Woolwich surcharge, characterized by the Clerk as a "scandal," is in dispute; and the report is therefore *sub judice*.
(3) The said report, unlike Bermondsey, simply extends reasons for the comparatively slight revision of the charges (£143 out of a total of nearly £1000, and as against the £846 claimed by the Company); but it significantly ignores every special contention of the Company, such as that "we had charged four times over for everything," and charged "120 guineas for ten conferences," &c.
(4) In fact, the report dealt with the simple figures, without any reference to the Company's contentions. It therefore has no bearing on the merits, while it certainly gives not only no "ample justification" for the Company's proceedings, but ignores their allegations.

As to any advantage by protecting themselves as ratepayers, the Company's proportion of the surcharge in Woolwich (if it is confirmed) is 40s.

The two Auditors practically held joint inquiries, and we have reason to believe that our clear vindication of the Company's indictment of "exorbitant charges," though confined to the Bermondsey report, was the considered opinion of both Auditors.

Eastbourne, May 28, 1909. THOS. DINWIDDY AND SONS.

At the annual meeting of Meters Limited last Tuesday, the Chairman (Alderman John Miles, of Bolton), in moving the adoption of the report, which was noticed in the "JOURNAL" for May 18, remarked that both it and the balance-sheet were very satisfactory. A year ago they had to deplore the fact that the prices of some of the staple articles used in their manufactures had gone very much against them. Since then, he was glad to say, the reverse had been the case. But the better state of their affairs was not entirely due to this. The Directors always had their eyes open to the importance of seeing what improvements they could make, either in the management of the works or in the way of cheapening the cost of production. But they never cheapened cost at the expense of the quality of their products. They also believed in keeping their premises and machinery in the highest state of efficiency; and the condition of the works now was far better than it was when they acquired them. In spite of the bad state of trade generally, their turnover in the past year had been satisfactory, and they were able to return to their 6 per cent. dividend on the ordinary shares, and put £5000 to the reserve fund—making it £60,000. The Directors had kept steadily in mind the desirability of increasing the reserve to £100,000; but when they would be able to attain this he could not say. The report was adopted and the proposed dividend approved. Mr. George Braddock, the Managing-Director, said that if they might judge of the results of the current year by the progress already made, they would have every reason to be satisfied.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress was made with Bills down to the rising of the House on Wednesday for the Whitsuntide recess :—

Bills brought from the Commons, read the first time, and referred to the Examiners: Harrogate Gas Bill, Llanelly Water Bill, Pontypridd Water Bill, West Gloucestershire Water Bill.

Bills reported, with amendments: Salford Corporation Bill, Stourbridge and District Water Board Bill, Yorktown and Blackwater Gas (Electric Lighting, &c.) Bill.

Bills read the third time and passed: Eastbourne Gas Bill, Gas Orders Confirmation Bills (Nos. 1 and 2), Lisburn Urban District Council Bill, Stourbridge and District Water Board Bill.

Bills Royal Assented: Conway Gas Bill, Heckmondwike and Liversedge Gas Bill, Leyland and Farrington Gas Bill, Littlehampton Gas Bill, South Lincolnshire Water Bill, Wells Gas Bill.

The Provost, Magistrates, &c., of Coatbridge, have petitioned against the Coatbridge Gas Order, and the Glamorgan County Council against the Llynvi Valley Gas Order, in the Gas and Water Orders Confirmation Bill.

The Gas and Water Orders Confirmation Bill, the Mountain Ash District Council Bill, and the Northallerton Water Bill, have been referred to a Select Committee, consisting of the Duke of Devonshire (Chairman), the Duke of Wellington, the Marquis of Anglesey, the Marquis of Zetland, and Lord Manners; to meet on Tuesday, July 6.

HOUSE OF COMMONS.

The following further progress was made with Bills down to the rising of the House on Thursday for the Whitsuntide recess :—

Bills brought from the Lords, read the first time, and referred to the Examiners: Gas Orders Confirmation Bills (Nos. 1 and 2), Lisburn Urban District Council Bill, Stourbridge and District Water Board Bill.

Lords Bills read a second time and committed: Alliance and Dublin Consumers' Gas Bill, South Staffordshire Water Bill.

Bills reported, with amendments: Donington Water Bill [Lords], Glamorgan Water Board Bill, Worksop Water Bill [Lords].

Bills read the third time and passed: Llanelly Water Bill, Oldham Corporation Bill, South Lincolnshire Water Bill [Lords], West Gloucestershire Water Bill.

LEGAL INTELLIGENCE.

ASSESSMENT OF THE PETERBOROUGH GAS-WORKS.

Peterborough Quarter Sessions.—Thursday, May 27.

(*Before Mr.* E. P. MONCKTON, *Chairman, and a Bench of Magistrates.*)

The hearing of the appeal of the Peterborough Gas Company against the assessment of their property in the parish of Peterborough Within, the first portion of the proceedings in which were reported in the "JOURNAL" for the 25th ult. (p. 533), was resumed last Thursday. The Assessment Committee, it may be remembered, fixed the rateable value of the property at £4360; and the Company are seeking to have the amount reduced to £2685—a difference of £1675.

Mr. W. C. RYDE and Mr. MORRES NICKALLS (instructed by Mr. W. B. Buckle) appeared for the Company; Mr. H. ST. JOHN D. RAIKES and Mr. H. L. WARD (instructed by Mr. H. B. Hartley) represented the Committee.

Further Evidence for the Company.

Mr. *John Barton*, the Manager and Secretary of the Company, in further examination, said that between the years 1902 and 1908 the receipts from the ordinary consumers fell by £1371, whereas those from prepayment consumers were multiplied ninefold. The growth of the Company's business, therefore, had been in the direction of having a larger number of consumers who cost the Company a great deal more in proportion to the quantity of gas they burnt. To-day the Company were paying more for their coal and charging less for their gas than they did in 1896; the object of reducing the price being to make gas more popular. In round figures, the increase in the assessment in Peterborough Within, from the last assessment in 1900, was £950.

In cross-examination by Mr. RAIKES, witness said that since 1902 the number of slot-meter consumers had been increased by more than 2000, though the ordinary consumers remained stationary. Last year the Company received £1300 less from the ordinary consumers than they did in 1902; and, on the other hand, £5000 more from the prepayment consumers. In 1902, the ordinary consumers represented 88 per cent. of the Company's customers, and only 44 per cent. last year; but this was due rather to the large increase in the number of slot-meter consumers than to any decrease in the ordinary customers. In 1908, when the price of coal went up, the Company were doing so well that the price of gas was not raised correspondingly, but reduced. At the close of 1908—the year when the mechanical stoker was purchased—the Directors' fees were increased, as was also the Secretary's salary. Asked what proportion of the electricity employed in Peterborough was used in competition with gas, witness replied that it was difficult to say. All the principal streets, shops, and hotels—all their Company's best customers—had gone, and they had had to go further afield to make up their consumption.

In re-examination by Mr. RYDE, witness explained that the amount of capital raised by the Company up to December last included all that had been charged to capital for meters, which meant that it represented tenant's as well as landlord's capital. It also included £8575 for what might be termed paper alteration in capital, and £25,786 for old works, bought in 1868, which were not now in existence. There was nothing in bricks and mortar to represent these old works. All that remained were a few street lamp-posts, which were at least forty years old. In fact, therefore, the effective capital of the Company was only £85,000 now in use, which included all meters and cookers which had been charged to capital.

The CHAIRMAN: What is the price of coke?

Witness: It varies very considerably—perhaps 13s. or 14s. per ton. It is a drug in the market just now. We can scarcely give it away. We put it on rail at 10s. 6d.

Is it a fact that you are charging some of your consumers 16s. 6d. a ton for coke?—That is only in very small quantities, not by the ton. We are selling it at 14s. to merchants.

In further answer to the CHAIRMAN, witness said that in 1902 and 1904 the maximum dividend was paid—5, 7, and 10 per cent. In 1908 the Company were on the sliding-scale—5 per cent. preference, 7½ per cent. consolidated stock, and no 10 per cent. As to the value of the Company's shares, £10 worth of 7½ per cent. of the new stock could be bought for from £15 to £15 10s. Since the last assessment, the 4 per cent. debenture stock had been increased at various intervals by £21,000. In addition to this, there was an increase of £8575 in the watered stock. It was not correct that last year the capital account was overdrawn, and the sum of £1000 taken from the undivided profits to meet this.

Mr. *Samuel Vergette*, jun. (Messrs. Fox and Vergette, of Peterborough), presented a valuation which substantially agreed with those of the previous valuers. He also put in a structural valuation of the undertaking, showing the value of the land, buildings, and mains to be £62,500. Witness expressed the opinion that a tenant would require interest at about 20 per cent. at least in order to be induced to take on an "anxious" business of the nature of that which was carried on by the Company.

Mr. *Corbet Woodall*, re-called, explained a calculation he had made which showed that the present works and mains could be replaced for from £60,000 to £70,000.

This concluded the case for the Company.

The Case for the Assessment Committee.

Mr. RAIKES then opened the case for the Assessment Committee by showing the effect of taking 10 per cent. on the hypothetical tenant's capital, instead of 17½ per cent. as claimed by the appellants, which would make a difference of £2000 in the assessment. He criticized certain items which made up the tenant's capital as put forward by the Company, and complained that in some respects the valuation of Mr. Ryde had been arrived at by rule-of-thumb or stereotyped methods, which, though perfectly lawful and proper in their way, were not sufficient in the present case. He claimed for the Committee's expert, Mr. Mason, that he had "gone one better" than Mr. Ryde, and had based his valuation direct on extracts from the books of the Company; the variation in the figures being partly accounted for by the fact that different periods had been taken. Mr. Mason started his year from July 1, 1907, and Mr. Ryde from Jan. 1, 1908; and he (Counsel) submitted that the former was the proper period to take.

Mr. *W. A. Mason* (Messrs. Hedley, Mason, and Hedley, of Birmingham) explained his valuation, amounting to £7919. The chief point of variation between this valuation and that of Mr. Ryde was the amount of capital required by the hypothetical tenant, which witness put at £14,900, of which he calculated £10,900 at 10 per cent. and £4000 at 5 per cent; making the interest on the tenant's share £1290.

Friday, May 28.

On the resumption of the hearing this morning,

Mr. *Mason* concluded his evidence on behalf of the Assessment Committee.

In cross-examination by Mr. RYDE, witness said his present valuation of the property in question was £7919, and the sum of £4759, against which the Company were appealing, was the valuation he had returned to the Committee, based on the obtainable profits. He had ascertained a profit of £7513, and had allocated £4900 of it to the landlord and the balance to the tenant, on the percentage of rather more than one-third to the latter and two-thirds to the former. His valuation ignored the reduction of 1d. per 1000 cubic feet in the price of gas as from Michaelmas last, and also the increases in the Directors' fees and the Secretary's remuneration, a part of which would go in as rent, and also because a portion was the landlord's charge and not the tenant's. He had not included lamp-posts in the tenant's capital, because he contended that they were on exactly the same footing as the main to which they were attached—a part of the freehold. It had once been his practice to omit transfer fees from the valuation; but he had not done so for many years. He had not included in the tenant's capital anything for the installation of prepayment meters, pipes, fittings, &c., which went to revenue and not to capital. The service-pipes were the property of the Company (who were in occupation right up to the meter), but not the cookers. The stock of coal in June last, when his valuation was made, was £900 worth, or 1200 tons. He accepted an average of 2162 tons for the past eight years, but contended that the incoming tenant would only take the coal found on the premises; and hence his valuation. He had given evidence in the South Metropolitan Company's case, and had allowed 15 per cent. on ordinary meters, 12½ per cent. on slot-meters, and 10 per cent. on the stock of coal, working capital, and local rates; but he was not the leading witness in that case.

Mr. RYDE: You do not suggest that you gave evidence on figures which you did not believe in?

Witness: They were excessive figures, in my opinion. The Deputy

Chairman of that particular Quarter Sessions had ordered the witnesses to allow 17½ per cent. on tenant's capital. This used to be a cast-iron rule; and a very unjust rule it was.

Do you not yourself allow 17½ per cent. on tenant's capital?—I have done in earlier days, I have no doubt.

Did you not, in valuing the undertaking of this very Company, allow 17½ per cent. on part of the tenant's capital.—Twenty years ago I dare say I did.

I have a valuation here which gives on meters, &c., 17½ per cent., cash balance 10 per cent.?—I did not know so much about gas companies then as I do now.

You put half the tenant's capital in those days at 17½ per cent., and the other half approximately at 10 per cent.?—Yes; in those days the stock of meters was very much smaller in proportion than it is now.

Mr. *W. P. Ryan* (Messrs. Morris and Ryan, of London) gave a valuation based on similar lines to that of Mr. Ryde for the appellants; one difference, however, being that he had taken four instead of three months' receipts from the prepayment meters, and four instead of five months' working expenses for the hypothetical tenant, during which period the tenant would require in cash £2549, as against Mr. Mason's estimate of £2600 taken from the Company's books. His valuation of the meters and cookers came to about £9500, against the £13,500 given for the appellants. He brought the tenant's total working capital to £12,675, and the tenant's share to £1419; so that within £200 or £300 he had practically arrived at the same result as Mr. Mason by following, in effect, the method adopted by the valuers for the Company.

Mr. RAIKES, in summing up the case for the Assessment Committee, said the period chosen by the appellants as the basis on which to make their valuation—the twelve months ended December, 1908—was not that on which the assessment was framed. He thought, however, it would be simpler, fairer, and probably more satisfactory, to decide the case practically upon broader grounds than those which could be furnished by the mere working-out of figures on either side. The Committee's valuation had been taken from the Company's books; and he said with considerable confidence that it did not lie in their mouths as a business company, after keeping books for the information of themselves and their shareholders, to come there and say that they desired a reduction in the rates, that their books were wrong, and that no attention must be paid to them. He asked the Justices to support Mr. Mason's valuation, and to say that the written documents in possession of the Company spoke for themselves. If they spoke against the Company, and gave an untrue result as regards values, so much the worse for the Company; but they were binding on the Court. As business men, he asked the Justices to consider what amount of return would tempt them, knowing the circumstances of the case, to invest money not in similar property but in this particular property. He contended the Company were not over-rated under the assessment.

Mr. Ryde's Reply for the Company.

Mr. RYDE, in reply, said a great deal of difficulty which had been introduced by the other side would disappear if they bore in mind his answer to the assertion that the Gas Company were earning large profits—viz., that they were not rateable for profits but for the rent they would give in order to earn those profits. His friend had quoted something; and he would adapt the quotation. He would not say "the lady" but rather "the two gentlemen" on the other side, Messrs. Mason and Ryan, "do protest too much." They were asked to believe that a tenant could be found to take these premises, and pay to the landlord £400 more than the profits he would earn, according to the £7500 valuation. Was he not therefore justified in saying that a valuation, on the face of it, which disproved itself like that could not be relied on, and must discredit the man who put it before the Court? The results arrived at by the other side were so impossible, having regard to the divisible profits, that the Court might well adopt the Gas Company's figures; nor did he ask the Court to split the figures between him and the other side, on the ground that his were a little bit exaggerated, as Mr. Raikes seemed to think that his might be.

The CHAIRMAN announced that the decision of the Court would be given at the next Quarter Sessions, on the 1st of July.

The Malvern Water Pollution Case.—In the House of Lords last week, an appeal was heard from an order of the Court of Appeal, setting aside a judgment and verdict for £7500 awarded in an action brought by the appellant, Dr. John Campbell Fergusson, the lessee and proprietor of a hydropathic establishment at Malvern, which was erected about 1843, and of which the appellant took a lease in 1891. The respondents were the sanitary authority of the district; and the action was brought to recover damages on account of the sewage pollution of water supplied by them. The appellant had been compelled to pay large sums of money by way of compensation to the visitors, patients, and inmates of his establishment. The case was noticed in the "JOURNAL" when it was before the Lower Courts. At the conclusion of the arguments, the Lord Chancellor said that in his opinion the ground had not been laid for interference with the decision of the Court of Appeal. Lord Macnaghten, Lord James of Hereford, and Lord Shaw concurred.

A Water Company Fined.—A case of great interest to water companies, also to consumers of water, was heard by the Guisborough Magistrates last week. The Guisborough Water Company were summoned for having neglected to supply sufficient water for domestic purposes to a dwelling-house in Bennison Street, Guisborough; and for about two hours the Magistrates were occupied hearing arguments for and against the supply having been cut off. A pipe which supplied a cottage in the street burst, and the official plumber to the Water Company was asked to repair it. This he refused to do unless the supply-tap was transferred from the back yard into the kitchen. Another plumber was engaged to do the necessary repairs, and the tap was not moved. The Company had the water cut off at the main, and the house was for some weeks without a supply. It was argued that the Company, in order to prevent waste of water, had issued regulations for taps to be fixed in the houses. Already owners of about 200 houses had had the position of the taps changed. The Bench decided to fine the Company £1, and £1 14s. 6d. costs.

MISCELLANEOUS NEWS.

SALFORD CORPORATION BILL.

Gas Clauses to be Withdrawn.

We learn from the "Manchester Guardian" that a meeting of the General Purposes Committee of the Salford Corporation, adjourned from the previous day, was held in private last Thursday, to consider what action should be taken on the Corporation Parliamentary Bill. Sir William Stephens presided; and there was a large attendance of members. The meeting lasted nearly two hours; and at the close it was stated that the portion of the Bill dealing with the gas undertaking was to be withdrawn. Alderman Phillips, the Chairman of the Gas Committee, moved that this action should be taken. He said that the ratepayers had had no opportunity of considering the decision of the Lords Committee; and the proposal of the Corporation to extend the gas-works and reduce the illuminating power would never have been passed if it had been understood that the Corporation would need to increase the rates by 6d. in the pound. The Deputy-Chairman of the Committee (Mr. Steele) seconded the proposal to withdraw the clauses; and members agreeing that they were not prepared to increase the rates by reducing the price of gas, the motion was generally agreed to, though two councillors contended that possibly some arrangements could be made with the other districts concerned which would not be quite so onerous as the decision of the Lords Committee, and which might meet with the consent of the Lords. During the discussion, some of the speakers commented upon the way the evidence of certain witnesses for the Corporation was given, and expressed an opinion that, but for these witnesses, there would not have been an adverse decision by the Lords.

WEST BROMWICH GAS UNDERTAKING.

The Past Year's Working.

The Borough Treasurer and Secretary to the Gas Committee of the West Bromwich Corporation (Mr. Thomas Hudson) has presented to the Committee his report for the year ended the 31st of March, which is accompanied by an abstract of the accounts for this period. The report furnishes the following particulars.

The borrowing powers stand at the same amount as at the date of the previous report—viz., £209,309. The loan indebtedness amounts to £136,999—a reduction of £2000; the sinking fund having been applied to this extent in the purchase of stock for redemption. The debt is equivalent to 8s. 4d. per 1000 cubic feet of gas sold—a slight average increase over the year 1907-8, brought about by the decrease in the quantity of gas sold. There is still £9072 in the sinking fund, which, deducted from the outstanding debt of £136,999, leaves a net indebtedness of £127,927—a reduction of £4731 during the year. The capital outlay account was increased by the cost of the additional lift and other extensions carried out to No. 3 gasholder, amounting to £1361, which was defrayed out of the year's revenue, and not by further borrowing. The total amount debited to this account to date is £241,966, of which £136,999 is still owing to the stockholders.

The total income for the year on revenue account was £55,500—a reduction of £3201 compared with the previous year. During the financial period just closed, nearly all branches of trade and industry in the borough suffered from somewhat serious depression; and Mr. Hudson says it is not surprising that in these circumstances the revenue of the undertaking has in consequence been adversely affected, as well as from other influences which are well known to the Committee. A considerable increase in the number of consumers nevertheless took place in the year, no less than 167 new connections having been made; and the number of consumers per mile of main is now 246, compared with 243 this time last year.

The sales of gas amounted to £40,530—a drop of £1505, which is the largest in any one year in the history of the undertaking. All classes of consumers show a falling off except the smaller ones at 2s. 8d. per 1000 cubic feet, and those using gas for manufacturing purposes at 1s. 5d. per 1000 cubic feet, both of which are slightly in excess. There was also a decrease of £1587 in the revenue from residual products, owing to reduced output, and, with the exception of coke, to the lower prices prevailing throughout the year.

The total quantity of gas sold was 329,345,388 cubic feet—a reduction of 12,718,352 cubic feet, equal to 3·71 per cent., compared with the previous year. The loss by condensation and leakage was 21,628,612 cubic feet, equal to 6·07 per cent. The number of houses in the borough in November last was 14,924, of which 5445 are supplied with gas through ordinary meters, and 5765 by means of prepayment meters—a total of 11,210. The number of consumers of all classes at the end of the financial year was 11,522—or an increase of 164.

The total expenditure on trading account amounted to £43,892—a reduction of £2365, due to the diminished production and output of gas, which necessitated the purchase of a smaller quantity of coal, and caused a consequent lower expenditure on other items. The total manufacturing charges, including maintenance of works and plant, showed a reduction of £1755, spread over the various items of expenditure, with the exception of sundry expenses, which were slightly higher. Distribution expenses were lower by £74. The cost of lighting and maintaining the public lamps showed a reduction of £243; the previous year's expenses being considerably above the average. The costs of general management, as well as the amounts paid in rates and taxes, were very similar to those of previous years, excepting the item of bad debts, which, for the first time in the history of the undertaking, exceeded the usual small dimensions. The expenditure was practically the same as the year 1907-8, though the output of gas considerably decreased; the quantity of gas sold per mile of main being 7,032,938 cubic feet—a drop of 296,789 cubic feet per mile.

The gross profit on the trading account was £11,608, against £12,444 before. The balance standing to the credit of the profit and loss account at the commencement of the year was £14,611, of which £1390 was employed in relief of the general district rate, and £2724 placed to the credit of the extensions suspense account, in pursuance of the minute of the Town Council; leaving a net balance of £10,829 to be carried forward. The gross profit of £11,608 for the past year has been charged with the interest on loans and corporation stock, and the proper instalment for the redemption and extinction of the debt, amounting together to £8291; leaving a balance of £3317 as the net profit for the year, compared with £4114 before—a decrease of £797. The cost of the recent extensions to No. 3 gasholder, to which reference has already been made, has been charged against the net profits, instead of raising new capital; and the available balance is consequently reduced to £1956. The debit balance on the extensions suspense account has been reduced by the sum of £2724, transferred from the profits of the year 1907-8; leaving a balance of £7530 still to be provided.

Mr. Hudson's report is accompanied by that of the Borough Gas Engineer (Mr. Harold E. Copp), on the general condition of the works, as well as on the manufacturing results obtained during the past year, from which we make the following extracts.

The condition of the water gas-plant has been the subject of a special detailed report, and is now receiving the consideration of the Gas Committee. With this exception, the works and plant have been maintained in a high state of efficiency. The new outer lift added to No. 3 gasholder has increased its capacity from 658,000 to over 1,000,000 cubic feet. The inner lift is arranged to rise beyond the guide-framing. The additional storage capacity has therefore been obtained at a very low cost (£1361), and during the past winter proved to be of great convenience. The work was carried out in a most satisfactory manner by Messrs. Ashmore, Benson, Pease, and Co., of Stockton-on-Tees.

Owing to the increasing demand for the smallest size of cut coke, which is used principally for forging purposes, it has been necessary to fix an additional coke-cutting machine, and to raise the hydraulic coke hoist about 4 feet to accommodate the machine. This work was carried out by Messrs. Gibbons Bros., Limited, of Dudley. At the same time a subway was constructed from the retort-house to the foot of the hydraulic hoist, for facilitating the removal of coke.

The stoking machinery installed in 1906 continues to work in a thoroughly satisfactory manner. The maintenance of the plant amounted to 1·05d. per ton of coal carbonized for the discharging-machine, 0·21d. for the charging-machine, and 0·11d. for the engine and dynamo—a total of 1·37d. per ton of coal carbonized, against 0·68d. in the year 1907-8. The additional cost of repairs to the discharging-machine was due to the entire replacement of that portion of the machine which enters the retorts, and is consequently subjected to severe wear and tear. The total cost of carbonization last year amounted to £2107, or 1·41d. per 1000 cubic feet of gas made, compared with £2230, or 1·47d. per 1000 cubic feet, for the year 1907-8, and 2·11d. for the last year in which manual stoking-machines were used.

The quantity of coal carbonized was 27,331 tons, yielding 304,316,000 cubic feet of gas, or 11,141 cubic feet per ton, against 11,208 cubic feet per ton before; the slight drop being due to a somewhat increased difficulty with stopped ascension-pipes. The quantity of coke used for the production of water gas was 930 tons, yielding 52,131,000 cubic feet, or 53,300 cubic feet per ton of coke. The quantity of oil used was 31,766 gallons. The cost of water-gas manufacture, including oil gas and benzol for enrichment, amounted to £2433, or 11·2d. per 1000 cubic feet, against 12·46d. for the previous year. The proportion of water gas on the total production was 14·62 per cent., compared with 11·14 per cent.; and in spite of the increased proportion of water gas the calorific power of the mixed gas was 624 B.Th.U., compared with 621 B.Th.U. Mr. Copp explains that this is accounted for by the production of oil gas, which adds considerably to the heating value of the water gas, and renders it possible to use an increased proportion, in case of emergency, without detriment to the quality of the gas delivered, either as regards heating value or illuminating power. The total quantity of gas made was 356,447,000 cubic feet—a decrease of 8,799,000 cubic feet, or 2·41 per cent., on the previous year. The total manufacturing wages amounted last year to £5684, or 3·81d. per 1000 cubic feet of gas made, against £6064, or 3·98d. per 1000 cubic feet, in 1907-8. The total cost of manufacture and maintenance, including materials but exclusive of coal, was £6383, against £7313, which shows that the strictest supervision was exercised with a view to economy.

The coke produced was 16,971 tons, against 18,832 tons, of which 5888 tons were used for manufacture, compared with 6264 tons before. The cut coke amounted to 4278 tons—an increase of 130 tons. The yield of tar was 10·06 gallons, and of ammoniacal liquor 29·09 gallons, per ton of coal carbonized, as compared with 10·1 and 32·9 gallons respectively. The ammonium sulphocyanide recovered amounted to 1·4 lbs. per ton of coal carbonized.

The gas used on the works during the year was 5,473,000 cubic feet, against 5,410,000 cubic feet; the slight increase being due to gas employed for the generation of electricity for lighting purposes. The benzol used for enrichment was 52,615 gallons, or 0·147 gallon per 1000 cubic feet, against 50,137 gallons, or 0·137 gallon per 1000 cubic feet in 1907-8. The gas oil used was 32,016 gallons, or 0·088 gallon per 1000 cubic feet, against 14,951 gallons, or 0·041 gallon per 1000 cubic feet, before. The increased quantities of these enriching materials is stated to be due to the larger proportion of water gas last year.

In closing his report, Mr. Copp says the decrease in the sales of gas during the past year is a matter for much regret; and, in addition to the causes for the decrease to which reference has already been made, no small proportion must, he points out, be attributed to the generally increasing use of incandescent burners, and also to the continued improvement in illuminating efficiency obtainable from gas by the application of the most modern methods of lighting. He also expresses regret that the business of the fittings department showed a further falling off during the past year. The unaccounted-for gas last year amounted to 21,509,000 cubic feet, or 6·02 per cent. on the total quantity made, against 17,772,000 cubic feet, or 4·8 per cent. before. There were, however, several serious fractures of mains, by which a considerable volume of gas was lost. With a view to reducing this loss, a systematic investigation of the condition of the mains, as well as the testing of all large meters, is now in progress; the pressures maintained throughout the past year having been much the same as during several previous years. The discrepancy between the average temperature at the station meter and the mean atmospheric temperature was 3·2° Fahr. in excess of that of the year 1907-8; and this fact accounted for an increase in volume of nearly 2 million cubic feet of gas accounted for. There was a considerable increase in the number of consumers' burners attended to by the Gas Department, and Mr. Copp says the system appears to be much appreciated by consumers, as no doubt incandescent gas lighting has suffered much loss of popularity through the indiscriminate sale of inferior burners and mantles.

The number of public lamps remained practically the same last year as before—viz., 1081, of which 797 were fitted with incandescent burners. Automatic lighters have been installed in one district, and have been found to work in a satisfactory manner.

DUNDEE GAS SUPPLY UNDERTAKING.

Accounts for the Past Year.

The "Dundee Advertiser" of Thursday last contained the following statement relating to the Corporation gas undertaking.

As already hinted in the "Advertiser," the price of gas for the current year is to be reduced by 1d. per 1000 cubic feet—making it 2s. 3d. instead of 2s. 4d. as last year, which will be the lowest price on record. This is the net result of the accounts and estimates of the department, which have just been issued. During the year the net income from gas was £91,128, as against £93,813 the previous year; coke brought in £20,776, as against £20,369; sulphate of ammonia, £9369, as against £10,157; tar, £3624, as against £4041; and waggon revenue, £1275, as against £1003. The total revenue was £126,172, as against £129,384. The expenditure included £79,167 for the manufacture of gas, as against £81,583 the previous year; £10,881 for distribution of gas, as against £12,295; £6438 for rents, rates, and taxes, as against £5889; and administration, £3983, as against £3797. The total expenditure on revenue account was £100,470, compared with £103,564 the previous year. The balance carried to net revenue account was £25,702; and, after paying annuities, interest, and sinking fund—£11,171—there is a balance of £2191 to be carried to the current year's account. The total amount of gas made was 875,887,000 cubic feet, of which 20,829,000 feet was carburetted water gas. In the manufacture there were employed 86,815 tons of coal, 72,343 gallons of oil, and 72,749 gallons of benzol. The yield in gas per ton of coal was 9849 cubic feet. The cost of production was 1s. 3·64d. per 1000 feet of coal gas, and 1s. 3·53d. of carburetted water gas. There are at present 32,274 ordinary meters in use, and 15,606 automatic meters, or a total number of consumers of 47,880. The number of ordinary meter users has been gradually decreasing for the last six years. But the loss has been more than made up by increases in the automatic meter users; so that the total number of consumers has been steadily advancing. The cookers, grillers, and rings on loan number 17,222—an increase of 3075. The balance of capital debt on the department at the end of the year was £378,717. The estimates for the current year, as already stated, provide for the price of gas being 2s. 3d. per 1000 cubic feet. The cost of production is expected to be: For coal gas, 1s. 1·84d.; and for carburetted water gas, 1s. 3·54d., per 1000 cubic feet. The total quantity of gas to be produced is 892,968,000 cubic feet. The total income is put down at £122,326, of which £89,964 will be from gas, and the balance from residual products. The expenditure is calculated to leave a balance of £793 to meet contingencies or emergencies.

HEYWOOD CORPORATION GAS DEPARTMENT.

The Past Year's Working.

The Gas Engineer and Manager of the Heywood Corporation (Mr. W. Whatmough) has lately presented to the Gas Committee his report for the year ending the 31st of March last. The gross revenue amounted to £21,601, and the gross expenditure, less interest and sinking fund, to £15,947; leaving a gross profit of £5654, or a decrease of £1065 compared with the preceding year. The net profit amounted to £223, or a decrease of £1135, due principally to bad trade, the increased cost of coal, the reduction in the price of gas, and diminished consumption of gas for public lighting. The receipts for gas sold for all purposes amounted to £16,992, compared with £18,000, or a drop of £1008. The decreased sum received for gas for ordinary private consumption was £1056, and for public lighting £195. Prepayment meters and stoves and gas for motive power showed an increase of £115 and £128 respectively. The revenue from residuals was £4245, against £4504, or £259 less. There was a lower expenditure by £368 in respect of manufacture; but had the price of coal remained the same as in the preceding year, the total decrease would have been £690—showing that the higher cost per ton caused an additional outlay of £322.

With regard to manufacture, during the past year 576 tons of cannel and 11,689 tons of coal were carbonized—a total of 12,265 tons, against 13,085 tons in 1907-8, or a decrease of 820 tons. The gas made per ton of coal was 10,859 cubic feet, compared with 10,770 cubic feet, or an increase of 89 cubic feet. The total quantity of gas manufactured amounted to 133,190,000 cubic feet, or a decrease of 7,743,000 cubic feet; and the total quantity sold to 123,026,469 cubic feet, or a decrease of 5,549,079 cubic feet. The quantity not accounted for was 9,047,631 cubic feet, or 6·79 per cent., against 7·88 per cent. before, or a decrease of 1·09 per cent., which is equal to a saving of 1,452,000 cubic feet.

The following statement furnished particulars of consumption for the past year :—

	Cubic Feet.	Per Cent.
Shops and dwellings, ordinary meters	58,086,554	46·78
,, prepayment meters	13,306,500	10·72
Mills and workshops	20,168,550	16·24
Public lamps	5,351,305	4·31
Stoves	18,659,700	15·03
Motive power	7,453,850	6·00
Office, works, show-room, and public clocks	1,135,900	0·92
Total consumption	124,162,369	100·00

The gas consumed in dwellings and shops through ordinary meters decreased by 1,469,746 cubic feet, that used for public lighting by 1,256,033 cubic feet, and for mills and workshops by 4,134,600 cubic feet; but gas supplied through prepayment meters showed an increase of 494,000 cubic feet, and that used in stoves and for motive power 817,300 cubic feet. Of the total gas sent out, the quantity delivered between 6 a.m. and 6 p.m. was 56,645,000 cubic feet, or 42·52 per cent., and between 6 p.m. and 6 a.m., 76,565,000 cubic feet, or 57·48 per cent. There was a decrease of 436 in the number of incandescent burners on maintenance last year, due to short time in the cotton mills and high-pressure lighting.

In closing his report, Mr. Whatmough expresses regret that the financial result presented is not so favourable as in preceding years. But Heywood, being principally engaged in the cotton industry, has suffered from bad trade; and this, together with the reduction in the price of gas, the fall in the value of residuals, the increased cost of coal, rates and taxes, and the charge to the sinking fund, are the principal causes of the reduced profit.

LEIGH (LANCS.) GAS AND WATER SUPPLY.

The Past Year's Working.

The Gas and Water Engineer of the Leigh Corporation (Mr. James Gibson) has submitted to the Committee his reports for the year ended the 31st of March. As briefly mentioned last week, the net amount realized by the gas undertaking was £3238. This was arrived at after deducting from the profit of £3915 a sum of £677 capital expenditure and special charges paid out of revenue. This time last year, the credit balance carried forward was only £850. The gross profit was £13,394, or 7·9 per cent. on the capital employed. The only addition made to the manufacturing plant during the year was a retort-house governor. The remaining four arches of the bench of inclined retorts have been completed; so that within the last two years the whole bench has been rebuilt. The Committee made a new departure last year in the hiring-out of gas-fittings; and the cost of these, as well as of the governor and arches, was defrayed out of revenue, as mentioned above. Additional mains to the extent of 787 yards were laid last year; bringing up the total to 50 miles 769 yards. The number of consumers on the 31st of March was 7708, compared with 7437 on the corresponding date last year; the number of gas-stoves in use being 2445, against 2464. The quantity of gas sent out was 145,297,000 cubic feet; being an increase of 664,000 cubic feet, or 0·46 per cent., on that of the preceding year. This is considered very satisfactory, in view of the fact that up to the end of November there was a decrease of no less than 1,775,000 cubic feet, owing largely to the cotton strike. The make of gas per ton of coal carbonized was 11,001 cubic feet; being slightly more than in the year 1907-8, due to the greater efficiency of the new retort-settings. The average cost of coal, benzol, oil, and carting was 11s. 9·104d. per ton of coal carbonized, which was a slight advance on the previous year; but the cost of coal, &c., per 1000 cubic feet of gas sold showed a slight reduction, owing to the increased make per ton. The prices obtained for coke were most satisfactory; the receipts from this source being £317 more than those for the year 1907-8. The revenue from the other residuals, however, declined. The quantity of saleable coke was 143,890 cwt., or 11·02 cwt. per ton of coal; of tar, 16,059 cwt., or 1·23 cwt. per ton; of sulphate of ammonia, 2780 cwt., or 23·86 lbs. per ton.

Mr. Gibson's report on the water undertaking shows a loss of £1086 on the revenue account for the past year, compared with £611 in the year 1907-8. The deficit is stated to be the outcome of a steadily-increasing consumption, due partly to the conversion of dry to water closets, and the change from the old to the new system of supply, whereby each consumer can have a separate service-pipe. The quantity of water used is thus increased without adding to the revenue. As no addition to the income can be expected from the assessed charges, Mr. Gibson thinks it would be advisable for the Committee to avail themselves of every possible source of revenue. Owing largely to the plentiful supply of water available in every part of the borough, the consumption has increased from 9·17 gallons per head per day in 1901 to 14·89 gallons in the year just closed; the total amounts paid to the Liverpool Corporation for water in these years having been £3353 and £6281 respectively. With the adequate supply of water now available, such increase, Mr. Gibson says, must be regarded as inevitable. The total quantity of water distributed was 251,250,000 gallons, divided as follows: Trade and domestic purposes, 50,624,700 gallons, at 1s. 4·61d. per 1000 gallons, £3505; 1,144,900 gallons supplied to the Astley Parish Council, £38; 199,480,400 gallons supplied on assessment and for cattle, at 7·41d. per 1000 gallons, £6159—total, £9701, compared with £9550 in the preceding year. The total average yield to the water-rental was 9·26d. per 1000 gallons. The total capital invested in the water undertaking up to the 31st of March was £61,578; the capital expenditure under the Leigh Corporation Act, 1903, up to that date having been £19,387. The whole of the supply was obtained from the Liverpool Corporation, at a cost of £6302.

Fatality in the Kirkcaldy Gas-Works.—A few days ago, Nigel Martin, a builder, met his death in the Kircaldy Gas-Works. He was engaged in work in connection with the retort-bench, when part of the arch of the oven fell upon him, burying him among the *débris*. He appeared to have been killed instantaneously. It was a sad circumstance that the father of the unfortunate young man was superintending the work when the accident happened.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 570.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17½—18	..	5 11 1	561,000	Stk.	Feb. 25	10	Liverpool United A. .	225—227	..	4 8 1
298,955	10	,,	7	Do. 7 p.c.	12⅝—13	+¼	5 7 8	718,100	,,	,,	7	Do. B . .	168—170	..	4 2 4
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	95—100	..	4 0 0	306,083	,,	Dec. 30	4	Do. Deb. Stk.	105—107	..	3 14 9
200,000	5	May 27	6⅓	Bombay, Ltd.. . . .	5⅛—5⅜*	..	5 12 7	75,000	5	Dec. 11	6	Malta & Mediterranean.	4¾—5	..	6 0 0
40,000	5	,,	6⅓	Do. New, £4 paid .	4⅞—4⅝*	..	5 18 10	560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
50,000	10	Feb. 25	14	Bourne- 10 p.c. .	28¼—29¼	..	4 14 11	250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
51,810	10	,,	7	mouth Gas B 7 p.c. .	16⅞—17	..	4 2 4	541,920	20	May 27	3½	Monte Video Ltd. . .	12⅝—12⅞*	..	5 8 9
53,200	10	,,	6	and Water Pref. 6 p.c.	15⅝—15⅞	..	3 15 7	1,775,892	Stk.	Feb. 25	4½	Newc'tle & G't'sh'd Con.	106½—107½	..	4 3 9
380,000	Stk.	,,	12½	Brentford Consolidated	250—252	..	4 19 2	518,795	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	91—93	..	3 15 3
300,000	,,	,,	5⅓	Do. New . . .	189—191	..	4 19 6	15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19½—20	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	122—124	..	4 0 8	55,940	10	,,	7	Do. 7 p.c.	13—13¼	..	5 3 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	101—103	..	3 17 8	300,000	Stk.	Apl. 29	8	Oriental, Ltd. . . .	137—139	..	5 15 1
220,000	Stk.	Mar. 12	10⅔	Brighton & Hove Orig.	212—214	..	5 0 6	60,000	5	Mar. 31	8	Ottoman, Ltd. . . .	6—6⅛	..	6 8 0
246,320	,,	,,	7½	Do. A Ord. Stk. .	154—156	..	4 19 4	31,830	53	Feb. 25	13	Portsea Island A. . .	137—139	..	4 19 0
461,000	20	Apl. 16	10	British	42½—43½	..	4 12 6	60,000	50	,,	13	Do. B. . .	129—131	..	4 19 3
109,000	Stk.	Feb. 25	6⅓	Bromley, Ord. 5 p.c. .	118—120	+1	5 0 0	100,000	50	,,	12	Do. C. . .	119—121	..	4 19 2
165,700	,,	,,	4½	Do. do. 3½ p.c. .	88—91	+1½	4 18 11	114,800	50	,,	10	Do. D and E.	101—103	..	4 17 1
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13½—14	+¼	5 0 0	398,490	5	May 13	7	Primitiva Ord. . . .	6⅞—7	..	5 0 0
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4	796,583	5	Jan. 28	5	Do. 5 p.c Pref. .	5⅛—5⅜	..	4 10 11
103,000	10	—	—	Cape Town & Dis., Ltd.	4½—5	..	—	488,903	100	Dec. 1	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
100,000	10	—	—	Do. 4½ p.c. Pref. .	5⅜—6	..	—	1,200,200	10	Apl. 29	8	River Plate Ord. . .	14½—15	..	5 6 8
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48—49	..	6 2 5	312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77—79	..	5 13 11	250,000	10	Mar. 31	8	San Paulo, Ltd. . . .	13¾—14½	..	5 12 3
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord. . .	109—111	..	4 10 1	62,500	10	,,	—	Do. 6 p.c. Pref. .	11½—12	..	5 0 0
1,493,280	Stk.	Mar. 12	5½	Commercial 4 p.c. Stk. .	108—110	..	4 14 6	125,020	50	Jan. 2	5	Do. 5 p.c. Deb. .	50⅜—51⅛	..	4 17 1
560,000	,,	,,	5	Do. 3⅜ p.c. do. .	102—104	..	4 16 2	135,000	Stk.	Mar. 12	10	Sheffield A	236—238	..	4 4 0
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5	269,981	,,	,,	10	Do. B	233—235	..	4 5 1
800,000	Stk.	,,	5⅓	Continental Union, Ltd.	100—102	..	4 18 0	523,500	,,	,,	10	Do. C	233—235	..	4 5 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	139—141	..	4 19 3	70,000	10	Oct. 29	10	South African	14—14½	..	6 17 11
492,270	Stk.	—	5	Derby Con. Stk. . . .	121—123	..	4 1 4	6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	123—125	..	4 5 4
55,000	,,	—	4	Do. Deb. Stk. . . .	103—105	..	3 16 2	1,895,445	,,	Jan 14	3	Do. 3 p.c. Deb.	85—86	..	3 9 9
145,995	,,	Mar. 31	5	East Hull 5 p.c. Ord. .	97—99	..	5 1 0	209,823	Stk.	Mar. 12	8	South Shields Con. Stk.	152—154	..	5 3 11
486,093	10	Jan. 28	12	European, Ltd. . . .	24—24½	..	4 18 0	605,000	Stk.	Feb. 25	5½	S'th Suburb'n Ord. 5 p.c.	120—122	..	4 10 2
354,660	10	,,	12	Do. £7 10s. paid.	18—18½	..	4 17 4	60,020	,,	,,	5	Do. 5 p.c. Pref. .	122—124	..	4 0 8
15,161,545	Stk.	Feb. 11	4/10/8	Gas 4 p.c. Ord. . .	103½—104½	..	4 6 6	117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124—126	..	3 19 4
2,600,000	,,	,,	3½	light 3½ p.c. max. .	88—89	..	3 18 8	502,310	Stk.	May 13	5	Southampton Ord. . .	107—109	..	4 11 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	105—107	..	3 14 9	120,000	Stk.	Feb. 25	6⅔	Tottenham A 5 p.c.	132—134	..	5 0 9
4,193,975	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	86—87	+1	3 9 0	423,940	,,	,,	5½	and B 3½ p.c. .	111—113	+1	4 12 11
258,740	Stk.	Mar. 12	4⅔	Hastings & St. L. 3½ p.c.	93—95	..	5 0 0	149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	101—103	..	3 17 8
82,500	,,	,,	6⅔	Do. do. 5 p.c.	118—120	..	5 4 2	182,320	10	,,	8	Tuscan, Ltd.	8⅞—9⅛	..	8 13 0
70,000	10	Apl 29	11	Hongkong & China, Ltd.	17½—18	..	6 2 3	149,900	10	Jan. ,,	5	Do. 5 p.c. Deb. Red.	101—103	..	4 17 1
123,500	Stk.	Mar. 12	6⅓	Ilford "A" and "C" .	138—140	+3	4 12 10	236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105—107	..	4 13 6
65,780	,,	,,	5	Do. "B"	105—107	+2	4 13 6	255,626	Stk.	Feb. 25	6⅓	Wands- B 3½ p.c. .	139—141	..	4 12 2
63,000	,,	Dec. 30	4	Do. 4 p.c. Deb. . .	102—104	..	3 16 11	79,416	,,	Dec. 30	3	worth 3 p.c. Deb. Stk.	73—75	..	4 1 1
4,940,000	Stk.	May 13	8	Imperial Continental .	180—182	−1	4 7 11	895,872	,,	Feb. 25	5½	West Ham 5 p.c. Ord. .	121—123	..	4 5 4
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2	210,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—127	..	3 18 9
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c. .	120—122	..	4 18 4	253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk..	107—109	..	3 13 5

† Nex dividend will be at this rate. Prices marked * are "Ex div."

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

Increase in Consumers, but Decrease in Sales.

The Ordinary General Meeting of the Company was held last Thursday, at the London Offices, No. 90, Cannon Street, E.C.—Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash, F.C.A.) read the notice convening the meeting, the minutes of the previous meeting, and the Auditor's report; and the report of the Directors and the statement of accounts (noticed in the "JOURNAL" last week, p. 541) were taken as read.

The CHAIRMAN said the report was a brief one; but he thought it contained practically all that there was to say in regard to the position of the undertaking at the present time. At the last annual meeting, he ventured to remark that the Directors were hoping for a speedy day of improvement in the commercial prospects of Port Elizabeth; but he was sorry to have to say now that they were still hoping, for their hopes had not yet been realized. Trade continued to be very much depressed in Cape Colony and in South Africa generally; and, of course, the Association had felt the effects of this to a very considerable extent indeed. The competition, too, to which he referred at the previous meeting, had continued in a very strong way against them. Many of their large customers—such as the hospital, for instance, who were always an excellent consumer to the Gas Company—were now taking electric light. He did not know that it would be much consolation to the shareholders in the Association to learn that the Municipality were scarcely making a profit out of their electric light, for the competition certainly affected them. The current was probably sold at so low a price that it did not repay the owners of the electricity undertaking; but it injured the gas business. Notwithstanding all this, however—the bad times and the competition—it was satisfactory to note that the profit for the year now under review was slightly better than that for 1907. This perhaps, might seem rather strange, considering the circumstances of business, because there had been a decrease in the amount of gas sold—a considerable falling off, which, he was sorry to say, showed no check at the present moment. Both in quantity and in money value for the sale of gas they were worse off than they were twelve months ago; but the saving feature had been that they had obtained their coal at a lower price—at a better price, in fact, he thought, than they had ever had it before in the history of the Association—and they had also effected certain economies in the manufacturing part of the business. Thus they were enabled, notwithstanding the reduction in sales, to realize a somewhat better profit than was the case last year. With regard to coal, the Directors were much hoping that they would secure it at a yet cheaper rate than at the present time. The proprietors had heard him say on several occasions that the Board were looking forward to the day when they would be using Natal coal. This time had not, however, yet arrived. They were constantly testing it; but there had hitherto been difficulties in connection with transport. The Directors were hoping—he might almost say they were monthly hoping—that they would get over these difficulties, and that as a result they would effect a very important saving in the cost of manufacture, when compared with the use of English coal, as at the present time. They had, of course, continually to press forward their business; and in this respect their Manager (Mr. William Arnott) was most energetic, and took care never to lose an opportunity. Therefore they were increasing the mileage of their mains. In this way, nearly 1¾ miles had been added during the past year, within which period the number of consumers had also slightly increased. He wished, however, that they would consume as much gas per head as they used to do. But this was a significant feature: Everybody was enconomizing and cutting down the use of gas; and while the average consumption some years ago per consumer was something like 33,000 cubic feet a year, it was now not very much over 15,000 cubic feet—which was a reduction, roughly speaking, of 50 per cent. Still, the Association had a larger number of smaller consumers—that was what it really meant; and they were using the gas for cooking and so forth. The result was that they had just been able to keep things right. He did not wish to be too despondent; but, on the other hand, he would not like to be too hopeful, because it was difficult to say what would be the result of trading in the near future. The shareholders would notice from the report that at Grahamstown there had been a small increase in the sale of gas. This was also reported last year. Of course, Grahamstown was a place which was not affected by commercial depression in the same way as was Port Elizabeth. He would add that everything about the works was thoroughly well maintained. This was a matter that the Board always looked after. They had not felt it necessary, in the face of the facts to which he had drawn attention, to make any reduction in the dividend, though, of course, the shareholders would have seen that, in paying the same dividend as had been paid since the Association started, it was necessary to draw a little upon the carry-over, by which the sum carried forward would be reduced. In conclusion, he moved the adoption of the report and accounts.

Mr. ANDREW L. DON seconded the motion.

Mr. F. D. MARSHALL asked whether the Association worked under a concession.

The CHAIRMAN replied that there was no concession at Port Elizabeth, but there was one at Grahamstown.

The resolution was then carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. HENRY WOODALL, a dividend at the rate of 10 per cent., free of income-tax, for the past year (less the interim payment) was declared.

The retiring Director (Mr. Henry Woodall) was re-elected on the motion of the CHAIRMAN, seconded by Mr. A. W. OKE; and the Auditor (Mr. Percival D. Griffiths, F.C.A.) was re-appointed, on the proposition of Mr. F. R. SMITH, seconded by Mr. MARSHALL.

Mr. SMITH proposed a hearty vote of thanks to the Chairman and

MAINTENANCE

The "NEW DAVIS."

IS the chief ground upon which we claim supremacy for the "NEW DAVIS" Screwless Cooker.

A Customer Writes:

"ENCLOSED please find Cheque in settlement of your account for No. 109 'NEW DAVIS' Cooker. I must also add that I am very pleased with it, ***and find it answers your advertisement in every way."***

The Davis Gas Stove Co. Limited

Diamond Foundry, LUTON.

Directors; remarking that they had had a most anxious time. All companies carrying on industrial operations in South Africa had, he said, suffered; and it was not to be wondered at that the Association had felt the effects of bad trade. In spite of this drawback, however, the Directors had managed to pay the same dividend—certain economies having been secured which had been of great advantage to the Company.

Mr. JAMES RANDALL seconded the vote, which was heartily accorded.

The CHAIRMAN, in acknowledging the compliment on behalf of himself and his colleagues, admitted that they had passed through a rather anxious time. To see some of one's best customers going away was, he said, never a pleasant thing; but the Directors believed that, by carefully watching the interests of the concern, they would be able to maintain their position to the satisfaction of the shareholders. The Association had very good servants both here and in South Africa; and he would not like this occasion to pass without thanking them for the efforts they had put forth on behalf of the Association. He was sure the shareholders would not grudge to those who were working so far away in their interests an expression of thanks, and also of confidence, which could be conveyed to them.

The vote was unanimously agreed to; and the meeting separated.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

What appears to be another instance of officious interference on the part of the Scottish Office with the proposals of local authorities is reported from Hamilton, the Corporation of which are at present promoting a Provisional Order. The statement is that the Examiner appointed under the Standing Orders has reported that the Orders have not been complied with, inasmuch as by clause 11 of the Provisional Order powers are taken which will enable the promoters to erect gas-works and extend and enlarge existing works, whereas no notices have been served upon the owners, lessees, and occupiers of all dwelling-houses situated within 300 yards of the lands upon which such works may be erected, extended, or enlarged, as required by Order No. 15. Locally some dubiety, it is stated, has been created by this intimation, as to whether or not the Provisional Order has been dropped. The position of matters is that a clause was inserted to give statutory powers to the Corporation to use, for manufacturing purposes, portions of the gas-works grounds which have been acquired since the passing of the Hamilton Corporation Gas Act of 1878. The effect of the action of the Examiner may be that this clause in the Order may drop, if the Chairmen of Committees in both Houses of Parliament do not dispense with the Standing Orders. The Corporation were advised by their Parliamentary Agents that, following upon precedent, the serving of notices upon the owners, lessees, and occupiers of dwelling-houses situated within 300 yards of the proposed new or extended gas-works was unnecessary where the ground was already included within the boundaries of the gas-works property. It is surely placing a finical interpretation upon law to say that a corporation possessing statutory powers for maintaining gas-works upon a site are not, if they subsequently acquire a piece of land adjoining, to be at liberty to erect any gas-manufacturing plant upon it until they have gone to the expense of obtaining further parliamentary powers. This may be the strict interpretation of the law; but it is not one which has been acted upon. I could cite an instance of such extension of gas-works which is going on at present, upon recently acquired ground, and where parliamentary sanction has not been asked for the new works. The procedure is regulated by section 18 of the Burghs Gas Supply (Scotland) Act, 1876, as to which, it is to be observed, there is no penalty imposed for non-compliance with the section. The Scottish Office seem to have regulations of their own, upon which they are acting.

In January last, the Corporation of Wishaw were so displeased at a suggestion by the Manager, that extensions (chiefly to the condensing and scrubbing plant) were necessary at the gas-works, that the proposal was made by the Gas Committee that the Manager should be granted a holiday; it being the intention, while he was away, to conduct the gas-works in such a way as to show that extension was not required. Though the proposal—an absurd one—received considerable support in the Council, it was defeated; and it was resolved to call in Mr. Thomas Wilson, of Coatbridge, to report upon the works, and as to whether or not extension was necessary. Mr. Wilson has reported; and the Town Council have, at a special meeting, considered his report. It has not been made public, but it is intimated that, after discussion, a recommendation that about £1000 should be expended upon the works was agreed to. By this it would appear that the Manager's position has been vindicated.

For some time past a difference of opinion has existed between the Gas Committee of the Perth Corporation and the Burgh Auditor as to the valuation of the stock of gas-meters in the hands of the Gas Department. The contention of the Auditor was that the valuation was overstated at £14,000. To settle the matter, it was resolved to have an independent valuation of the stock. This has now been done by Mr. Daniel Macfie, of Edinburgh, who has submitted a detailed statement, bringing out the value at £17,886.

At a meeting of the Edinburgh and Leith Gas Commissioners on Monday—Provost Smith, of Leith, in the chair—the Works Committee reported that, having taken up the remit as to the admixture of air with gas, and having read Mr. Pennell's letter to the Clerk, and considered his verbal explanation that his allegation was that the gas, after manufacture, was mixed with air, and in this state supplied to consumers (the grounds of such allegation, however, being refused to be disclosed), along with the Engineer's reply that the allegation was incorrect, but that air was, according to the invariable practice in the manufacture of gas, mixed in a certain small degree during such process, but afterwards and before distribution eliminated, Mr. Pennell

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moved that a remit be made to an engineeer—not a gas engineer—to investigate and report as to the procedure adopted at the Granton works. This was seconded by Councillor Douglas Elliot. Bailie Inches moved, as an amendment, that the Commissioners were satisfied with Mr. Herring's explanations; and Provost Smith seconded. The latter motion was adopted in Committee by fifteen votes to two. In the Commission, Bailie Bryson, the Convener of the Committee, moved the adoption of the report; and the Chairman seconded. Mr. Pennell asked for an inquiry; and moved that the matter be re-committed to the Committee. He considered that there should be a daily test of the gas, and thought the Board of Trade could not refuse to take cognizance of the admixture of gas and air, because they had issued regulations upon the subject. Mr. Herring said that the Board of Trade would never issue regulations for the mixing of air with gas. Such a statement was an absurdity from the very foundation. Mr. Pennell went on to say that there was a limit recognized by the Board of Trade, beyond which the admixture of air was inadmissible. Mr. Douglas Elliot again seconded, remarking that there was a very strong suspicion in the public mind in regard to the manufacture of gas. Mr. Herring pointed out that he had explained to the Committee the impossibility of air getting into the gas supply, and consequently into the gas when it was being tested. It was one of the complaints of the Commissioners before the Parliamentary Commission last year that the testing of the gas was only made about once a month; and the Commission arranged that the average of three tests was to be taken as the average illuminating power. So far as they themselves were concerned, the gas was tested at least four times a day. The testing-station in the City Chambers in Edinburgh was so far removed from the gas-works at Granton that any suspicion as to what might be done at the works could not hold good. The complaint about the pumping of air into gas had its origin more than a century ago. It was thought that air was pumped in in order to make consumers' meters go round. They would never dream of introducing 1 per cent. of air into the gas, and thereby lowering the illuminating power by 6 per cent. If it were considered economical to dilute gas, there were two or three other processes which they might use. But they did not want to dilute it; they wanted to give the public the best gas they could. He hoped they would excuse him for treating the matter seriously, as it was really a phantastic one, The report of the Committee was adopted by 13 votes to 3.

A question arose as to the illuminating power of the gas; Mr. Douglas Elliot asserting that Mr. Herring had told them that it was reduced to 17 candles. Mr. Herring said the present record was 18½ candles. Mr. Douglas Elliot reiterated that Mr. Herring told them that the illuminating power had been reduced as he had said, and that there had been no complaints, and he wished the Commissioners to take the responsibility. He (Mr. Elliot) had protested against this, and moved that the Commissioners do not reduce below 17 candles. They had had many complaints regarding the illuminating power of the gas. They had been told it was to reduce the price; but he thought the general community would rather pay a fair price and get a good article than have a reduction in price and lower quality. There was no doubt they had to burn more gas to get the same amount of light out of it. Bailie Lindsay, of Leith, moved that the Commissioners take no action in the matter. The facts were that before the Works Committee Mr. Herring stated that the large quantity of cannel bought was, in his opinion, sufficient for the production of gas of not less than 17 candles; but that during the winter there was just the possibility of severe weather affecting the gas, which might go down to (say) 16·99 candles, and that it would be extremely injudicious to be, perhaps the next day, producing gas of 17-candle power. The majority of the Committee thought it would be just as injudicious to tie Mr. Herring's hands in this matter; and in order to safeguard themselves and Mr. Herring, they not only bought the ordinary coal, but also 10,000 tons of high-grade cannel, so that there would be no risk of the gas going below 17 candles. Mr. Calder seconded. It was agreed by 12 to 4 votes to take no action as regards the illuminating power.

An exhibition of the gas appliances of Messrs. R. & A. Main, Limited, was held in the Rifle Club at Wick last week. It was closed on Friday evening by Provost Ross, who referred to the splendid display of goods which the manufacturers had, at considerable expense, brought to Wick. It was, the Provost proceeded, due to their excellent Gas Manager, Mr. M'Giffen, that the exhibition had been held, as it was he who suggested the idea of having it. Mr. M'Ewen, replying for Messrs. Main, said they were greatly pleased with their visit to Wick. It had proved satisfactory in every way. Orders had been taken for upwards of seventy stoves; and be believed that in a short time the number would be doubled. Miss E. M. Dods, of Dundee, was the lecturer in the exhibition.

The annual report of the Directors of the Bothwell and Uddingston Gas Company, Limited, states that the balance at the credit of the revenue account, after charging all renewals and bad debts, amounts to £3077. The sum at the credit of the profit and loss account, including a balance of £1489 from the previous year's account, is £4478, which the Directors recommend should be applied in payment of a dividend at the rate of 10 per cent. for the year on £23,000, and in making an addition of £1000 to the reserve fund; leaving to be carried to this year, £1178. The sale of gas was 59,018,000 cubic feet, realizing £8419. There was derived from coke £1968; from tar, £335; from sulphate of ammonia, £892; and from the hire of stoves, £55. The total revenue was £11,669, and the total expenditure £8591. The quantity of coal carbonized was 7120 tons. The coke made during the year amounted to 4200 tons, of which 533 tons were used on the works, and 3677 tons sold. The figures show that the Company have had a year's business which is altogether satisfactory, and with regard to which the Manager—Mr. L. Hislop—deserves all credit.

At a parish meeting of the Streatley ratepayers called to consider the advisability of adopting the Lighting Act, 17 voted for the motion and 47 against.

POPULAR WITH EVERY GRADE OF CONSUMER!

The Simplest way to increase your Yearly output, you will probably agree, is to be in the position to offer Apparatus which puts Gas to a new use in the Home, and which is found indispensable day in and day out, all the Year round, when once used.

Such Apparatus (bearing in mind the admitted unpopularity of the Gas Griller for Toasting) is

THE "RAPID" TOASTER

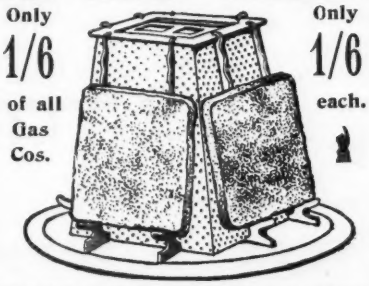
already well known throughout the British Isles, owing to the large amount of advertising direct to the Consumer which we are doing, as **A MOST EFFICIENT APPARATUS,** making, as it does, ***Four Slices of delicious Toast at once,*** and very quickly.

We Reproduce here

The essential part of an advertisement which we have inserted in many of the Daily Newspapers, and Ladies' Periodicals, and the success we have met with has encouraged us to take larger spaces in the various media, which are bound to cause you to get numerous enquiries for the Toaster from your consumers.

THE "RAPID" TOASTER.

Only 1/6 of all Gas Cos.



Only 1/6 each.

TOASTS FOUR SLICES AT ONCE!
Simply stand Toaster on Gas Ring and place four slices of bread on rests shown.

The "Rapid" Toaster is strongly made of sheet steel, and is manufactured by us in Birmingham.

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CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *May* 28.

The necessity for completing the covering of May contracts has induced greater activity, and for immediate delivery very full prices have in some cases been paid. At the close, however, the market is quieter; and the quotations are £11 2s. 6d. per ton f.o.b. Hull, £11 3s. 9d. per ton f.o.b. Liverpool, and £11 6s. 3d. per ton f.o.b. Leith. There continues to be inquiry in the forward position, but there has not been much actual business. There are buyers at £11 5s. per ton f.o.b. for delivery up to the end of the year; but this price is quite 2s. 6d. per ton below the ideas of makers. For delivery January-June, 1910, £11 15s. per ton is quoted; but £11 12s. 6d. per ton is probably about the value.

Nitrate of Soda.

The spot market is firm at 10s. 6d. per cwt. for 95 per cent., and 10s. 9d. for refined quality.

Tar Products. LONDON, *May* 28.

The market remains in about the same position, with the exception of pitch, which is very firm and slightly improved in price. There have been one or two sales made direct with the tar distillers and Continental consumers; and an increased price has been demanded and paid. In South Wales, there is a slight lull owing to the unsettled state of the coal market; but it is confidently predicted in many quarters that a strike will not take place. Creosote continues firm; and in London, the makers are somewhat independent as to selling for forward delivery. In the Midlands and in the North, good prices have been obtained. Benzol is very quiet, and sales are difficult to negotiate. Solvent naphtha is inclined to be weaker, although the manufacturers are not willing to take a lower price. Heavy naphtha is steady; but there is very little further business. Crude carbolic acid is in about the same position.

The average values during the week were: Tar, 11s. 6d. to 18s. 6d., *ex* works. Pitch, London, 27s. 6d. to 28s.; east coast, 27s. to 27s. 6d.; west coast, 26s. to 27s. f.a.s. Mersey ports, 26s. 3d. to 27s. 3d. f.o.b. others. Benzol, 90 per cent., casks included, London, 5⅞d. to 6d.; North, 5¼d. to 5½d.; 50-90 per cent., casks included, London, 6¼d. to 6⅜d.; North, 6d. to 6¼d. Toluol, casks included, London, 8¼d. to 8½d.; North, 7¼d. to 7½d. Crude naphtha, in bulk, London, 3½d. to 3⅝d.; North, 3d. to 3⅛d.; solvent naphtha, casks included, London, 11d. to 11¼d.; North, 9d. to 9½d.; heavy naphtha, casks included, London, 10⅜d. to 11¼d.; North, 9⅜d. to 10¼d. Creosote, in bulk, London, 2⅜d. to 2⅝d.; North, 2¼d. to 2⅜d. Heavy oils, in bulk, 2⅛d. to 2 15/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 2d.; west coast, 1s. 1d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

There is very little inquiry at the moment; and the only market where there appears to be any business doing is at Leith, where one or two parcels have been exchanged for delivery during the next month at £11 5s. to £11 6s. 3d. To-day, Beckton terms are £11; Hull, £11; and Liverpool, £11 1s. 3d.

COAL TRADE REPORT.

Northern Coal Trade.

There is (as is usual before a holiday week) a heavy demand for fuel, and a very full production; so that the shipments have been large, both of steam and gas coals. Best Northumbrian steams are in strong request. The price has been a little firmer, at from about 12s. 3d. to 12s. 4½d. per ton f.o.b.—the shipments to the Baltic being now regular and full. Second-class steams are from about 9s. 9d. to 10s. 6d. per ton; and steam smalls are in active request at from about 5s. 6d. to 6s. 6d. In the Durham coal trade, there is more briskness; for though the home consumption of gas coals is reduced at this season, there are increased needs from other quarters. Durham gas coals vary from about 9s. 3d. to 10s. 6d. per ton f.o.b., according to quality, for the usual classes; while for "Wear specials," up to 11s. 6d. is quoted. A contract for some 9500 tons of best Wear coals has been fixed for Randers at a price expected to leave about 11s. 1½d. per ton f.o.b.; so that it will be seen that the price obtained for this class of gas coal under contract is very near that currently quoted. In coke, the market is steady. This has its influence upon gas coke, which is only in limited output, and is now quoted from 12s. 9d. to 13s. 3d. per ton f.o.b. Tyne or Wear.

Scotch Coal Trade.

Ell coal and splint are still in poor demand. Steam coal is very plentiful. Evidently the belief in a strike or lock-out of the miners is not very widespread, as there is not much indication of a disposition on the part of consumers to stock coal. The prices quoted are: Ell 8s. 9d. to 10s. 6d., splint 9s. 6d. to 10s., and steam 9s. to 9s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 316,281 tons—an increase of 1927 tons over the preceding week, but a decrease of 5146 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,362,340 tons—an increase of 295,099 tons upon the corresponding period.

King Brothers (Stourbridge), Limited, is the title of a Company registered on May 22 with a capital of £50,000, in £10 shares (171 5 per cent. cumulative preference shares, 1829 6 per cent. preference shares, and 3000 ordinary shares). The registered office of the concern is at Park Lane, Netherend, Cradley, near Stourbridge.

Gas Plant and all constructional Steel and Iron Work.

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Gas Fires.

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Successful Pneumatic Switch Installations.

Pneumatic switches in connection with incandesent gas-burners have practically replaced the electric light at Madame Tussaud's well-known Baker Street exhibition. Some two years ago, a portion of the main hall was fitted with inverted incandescent gas-burners, on three and six light cluster pendants, actuated by the distance lighters of the Pneumatic Gas Lighting Company, Limited; and these have been found so satisfactory that there are now over 150 lights so controlled. The system has, the proprietors of the exhibition state, not only proved a great convenience, but has also effected a considerable saving in the consumption of gas. The building is now splendidly illuminated; the light being soft and well diffused. The Pneumatic Company have another installation just completed, and one that is also of importance to the gas industry. They have controlled the lighting of the Birds of Paradise House at the Zoological Gardens by means of two switches actuating six lights. This was brought about by the Superintendent with a view of minimizing the great mortality among the rare birds in this section. The birds of paradise occupy the outer cages; but in the centre of the room there are a great quantity of small and rare birds. The installation has now been carried out about three months; and it is stated that the result so far has been very encouraging. The two switches actuating the lights are placed in a switchbox outside the building. The keeper, in going his rounds at about 3 or 4 o'clock in the morning, switches on the lights in the building; and the birds then commence to feed, without being disturbed. This should be somewhat of a "poser" for those who prate about the deadly fumes of gas, for the authorities at the Zoological Gardens are not likely to have installed gas without being first assured that no harmful effects could possibly result from its use.

Paignton Water Supply.

In spite of the fact that the construction of the new water-works has only been completed within the last few years, the Paignton District Council are already considering the question of duplicating the main by which the water is brought from the Holne reservoir on Dartmoor to the town. The subject was discussed at the last meeting of the Council, when Mr. Milsom moved that, before anything was done in the matter, they should obtain the advice of Mr. Baldwin Latham, or some other competent Engineer, as to the best course to pursue. Mr. Milsom said they were informed by their own Engineer, Mr. Vanstone, that they could get a maximum supply of 600,000 gallons per day through the present main from the Holne reservoir; and after allowing 250,000 gallons per day for the supply of Teignmouth, they had 350,000 gallons for the use of Paignton and Brixham. In addition, there was a supply of about 200,000 gallons from the old Paignton reservoirs. This supply was in excess of their present needs, and ought to be sufficient for some time to come. Mr. Drew suggested a thorough discussion of the subject by the Water Committee, and moved an amendment which would have the effect of providing for this. Mr. Huggins was of opinion that an expert could not tell them anything which they did not know already. As a preliminary to any step which might be subsequently taken, a meter should be obtained so as to check the supply and prevent waste. Mr. Lambshead pointed out that they were under agreement with Teignmouth to duplicate the main, and that the matter had been thoroughly considered before coming to that agreement. They ought not, however, to proceed with the work unless they were satisfied it was absolutely necessary. Mr. Ham said the Teignmouth Council could not call upon them to duplicate the main for five years after they began to take water, and then they must give two years' grace. The Chairman (Mr. Parnell) thought the matter was one on which experts could be of little use. The question was referred to the Water Committee, with instructions to consult an Engineer or take any other step which they may consider necessary before coming to a decision. In connection with the new water supply, three Candy filters have been put down, with a view to neutralizing any plumbo-solvent tendency which may exist in the water, which is of soft moorland quality.

Newcastle-on-Tyne and Automatic Lamp Lighting.—At last Tuesday's meeting of the Newcastle City Council, Mr. Wallace asked with what object a deputation from the Watch Committee recently visited certain towns, thereby incurring expense to the extent of £85; and whether this amount was included in the estimates for the current year. Alderman Goolden, in reply, stated that the deputation referred to, which involved a total expenditure of £79, was appointed to visit Bournemouth, Tottenham, Lambeth, Windsor, and Liverpool, for the purpose of inspecting appliances for the automatic lighting and extinguishing of public lamps, and with a view to the adoption of one of the systems now in use, estimated to effect a saving to the city of from £2000 to £4000 per annum. The sum included in the estimates against this expenditure was £50. The report of the deputation, which would be issued in due course, would, he had reason to believe, show that a useful public service had been accomplished by the investigation.

Public Lighting of Launceston.—At the last meeting of the Launceston Town Council, a tender was submitted by the Gas Company for lighting the public streets for the year beginning Aug. 2 next, at the same rate as last year. The Company regretted that, owing to the continued high price of coal, they were unable to make a reduction in the cost of lighting the town. Mr. Hender pointed out that lighting cost the ratepayers more than 6d. in the pound of the rates; and he said that, while they did not want the Gas Company to supply them at a loss, they ought to get full value for the money. Alderman Treleaven expressed the opinion that there was no town in Cornwall which was so well lighted as Launceston. Mr. Reed thought the cost ought to be less; and said it was unfortunate that the Gas Company's purchases did not coincide with the drop in the price of coal. Mr. J. Treleaven, jun., remarked that gas coal was no cheaper; and Mr. Trood, as one engaged in the coal trade, said the price of coal was not any lower than last year. The tender was referred to the Lighting Committee.

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GAS COOKER.

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and Box No. 4 (G.P.O.) Dunedin.

Gas and Commercial Securities Corporation, Limited.

On the 24th ult., there was registered the "Gas and Commercial Securities Corporation, Limited," with a capital of £100,000 divided into 20,000 shares of £5 each, and £100,000 in debentures; the present issue being limited to £50,000 in shares and £50,000 in debentures. The prospectus (which will not be advertised) states that the Company is formed more especially for the purpose of acquiring and holding debentures and preference and ordinary shares in gas and commercial undertakings, under the guidance of a Board of Directors intimately acquainted with the circumstances of the gas industry, and with practical business experience. It is hoped that in course of time the Company may render services to established gas and water companies which, when issuing additional capital, have, it is pointed out, frequently a residue that is not taken up by their shareholders. This the Company might acquire on favourable terms. The number of Directors will not be less than three, nor more than seven; and the first three are Mr. Robert S. Gardiner, Mr. Stephenson R. Clarke, and Mr. Arthur F. Phillips, who have agreed to take 100 shares of £5 each. No contracts have been entered into; and no shares or debenture stock are being issued as fully or partly paid up otherwise than in cash. There are no founders' shares. No promotion money has been paid, nor any commission for underwriting shares. The Company will commence its operations with no liability, beyond the cost of registration and the preliminary expenses. The registered office is at No. 39, Lombard Street, E.C.

Gas Discounts at Belfast.—The Belfast Gas Committee had reported to them last week that the Council, at their last meeting, had referred the question of discounts back to the Committee for re-consideration. After some discussion, it was pointed out by Alderman Craig that all gas consumers using up to 400,000 cubic feet of gas per annum on the same premises are entitled to a discount of 15 per cent., while those using over that quantity are in receipt of 20 per cent., provided the account is paid in the Gas Office within one month from the date of furnishing the account; and in order to equalize the discount over all consumers, he proposed that the discount of 15 per cent. be increased to 20 per cent. The motion was passed.

A Falling Off in Profits at Leeds.—The Leeds Gas Committee have had before them the statement of accounts for the year to March 31. This showed a surplus profit of £5245, as compared with £14,708 the previous year. The gross profit was £93,538, being a decrease of £8449 as compared with 1907-8. After paying interest on loans £47,679, and other charges, a net profit of £40,979 remained; and from this £35,734 had to be set aside for the redemption fund. From the surplus profit, £3000 is carried to reserve fund, and only £2245 applied for rate relief. The falling off in profits is attributed to the increased cost of coal, and the decreased receipts for tar and other residuals. The latter cause accounts for £7600; and the cost of coal was nearly £2000 more.

London County Council and the Daylight Saving Bill.—At the meeting of the London County Council last Tuesday, the Parliamentary Committee recommended the Council to approve generally the provisions of the Daylight Saving Bill, 1909, and to authorize the Clerk to give evidence in support of the Bill. The General Purposes Committee, however, expressed the opinion that the circumstances did not warrant the Council in giving its unqualified approval to so highly contentious a measure, and Mr. Felix Cassel (the Chairman of the Parliamentary Committee) accepted an amendment proposad by Mr. D. S. Waterlow, M.P., to this effect, though, he said, it had been stated that if the Bill passed the Council would save £8000 a year. A vote was pressed for, and the amendment was carried by 40 to 28.

Wem Urban District Council and the Gas-Works.—At the last meeting of the Wem Urban District Council, a letter was read from the Secretary of the Wem Gas Company, Limited, to the effect that the two letters which had been received from the Council with regard to the gas-works had been laid before the Directors, who had requested him to state that they were not indisposed to consider the sale of their undertaking as a going concern at full value. Before entering into negotiations as to price, however, it would be necessary to have a valuation made; and they would not be justified in incurring this expense unless they were assured by the Council that they seriously contemplated purchase. Mr. Bowcock remarked that if the Company would offer their concern at a reasonable price, the Council would buy it. With regard to the question of a valuation, they would not be justified in paying for it. He proposed that the Council ask the Directors to state at their early convenience at what price they would sell the undertaking; and the motion was carried *nem. con.*

Staffordshire Potteries Water-Works Company.—In the report which was adopted at the annual meeting of the Company last week, the Directors stated that for the year ended March 31 the water revenue was £62,909, showing an increase of £484. The profit on the revenue account was £31,369. After providing for the interim dividend paid in December, there remained a balance of £16,806, which they recommended should be appropriated as follows: To the payment of a dividend at the rate of 9½ per cent. on the consolidated ordinary stock (free of income-tax), making, with the interim dividend, 9½ per cent. for the year; the payment of a dividend at the rate of 7 per cent. on the consolidated new ordinary stock (less income-tax), making, with the interim dividend, 7 per cent. for the year; balance for transfer to depreciation and contingent fund account, £2182. The Chairman (Mr. J. Maddock) said the meter revenue was less—a result which plainly showed that the trade of the district was not up to the average of the last few years. On the other hand, domestic rates, &c., showed an increase which more than made up the loss on sales for trade purposes. The Directors would ask the shareholders to sanction the raising of further capital, to enable them to carry out the work they were now engaged upon at Mill Meece, and for the extension of mains and other purposes, as might be required. At the subsequent extraordinary meeting, the Board were authorized to raise £12,000 by the issue of consolidated new ordinary stock, and £4000 by the issue of perpetual 3½ per cent. debenture stock.

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Assessment Appeal by the Cannock Gas Company.—At the Staffordshire Quarter Sessions, a few days ago, the Cannock, Hednesford, and District Gas Company appealed against the assessment of their works in the parish of Cannock. Their case was presented by Mr. W. C. Ryde, who submitted that the rateable value of the property should be reduced from £1607 to £1065. He failed, however, to convince the Bench; and the appeal was dismissed, with costs.

Liquidation of the British Cerofirm Company, Limited.—The report of the Official Receiver was issued last Friday to the creditors and shareholders of the British Cerofirm Company, Limited. The accounts show total liabilities of £10,508 and a deficiency in assets of £5623. The loss to the shareholders is returned at £115,723. The failure of the Company was, in the opinion of the Official Receiver, due to the fact that the original mantle purchased of the Cerofirm Gesellschaft proved valueless. Mr. H. M. Moody has been appointed Liquidator.

Coventry Superannuation Scheme.—The Coventry Corporation Gas Committee have re-considered their report as to the establishment of a scheme for providing pensions for certain men who have served in the department for long periods, but whose services it will be necessary to dispense with owing to the discontinuance of gas manufacture at the old works. The Committee have now decided to recommend the Council to adopt the following revised scheme of payments: (1) For men who have served 25 years and over, 10s. per week; (2) for those with 20 years', but less than 25 years', service, 8s. a week; (3) for those with 10 years', but less than 20 years', service, 6s. a week. Men under 45 years of age are to be placed in the third class notwithstanding that they have 20 years' service. The present scheme is regarded as equitable, and is likely to meet with general acceptance.

Reigate Electric Light Loan Refused.—The Reigate Town Council, at their last meeting, had before them a letter from the Local Government Board relative to an application to borrow a sum of £4000 for electric light purposes. The letter stated that the Board would sanction the borrowing of £1521 towards defraying excess expenditure up to March 31, 1908; but they were not empowered to authorize a loan for £133, paid in respect of the cost of the Provisional Order. In regard to the proposed borrowing of the sum of £2340 for prospective expenditure on mains, transformers, services, and meters, the Board "draw the attention of the Council to the very unsatisfactory financial position of the undertaking, and to the heavy losses which have been continuously incurred since the works were opened in 1901;" and they express the opinion that, "before any further loan is sanctioned, the Council should engage a highly qualified electrical engineer to investigate thoroughly the working of the undertaking, with the view of ascertaining what steps should be taken to place it on a more satisfactory footing." A Committee was appointed to interview the Board on the subject; it being stated that the Electric Lighting Committee as a whole are not in favour of having expert advice.

New Issue of Ilford Gas Company's Stock.—The whole of the £7500 of ordinary "C" stock and of the £2500 of 4 per cent. debenture stock of the Ilford Gas Company for which tenders were invited in the "Journal" a few weeks ago was disposed of on the 25th ult. as follows: The ordinary stock at prices ranging from 133¼ to 137½; and the debenture stock at prices ranging from 100⅜ to 101. The applications for the ordinary stock amounted to more than two-and-a-half times the quantity offered.

Former Belfast Timekeeper Sentenced.—At the Belfast Recorder's Court on Friday, Charles H. Moorhouse, a former timekeeper at the Corporation gas-works, was sentenced to twelve months' imprisonment with hard labour for falsifying his books and embezzlement during the past five years. Before sentence was passed, Mr. Campbell, for the accused, made an appeal to the Acting Recorder for leniency. The prisoner, he said, had been overwhelmed with domestic trouble. His wife, who was now with her two children living with the prisoner's father in Manchester, had been for a long period in delicate health; while for years he had had to support an invalid sister.

A new reservoir with sand filtration proposed to be provided at Croydon will, it is estimated, cost £91,000. The Town Council have deferred their decision on the matter.

The Lesmahagow Gaslight Company has been registered with a capital of £4000, in £1 shares, for which the public are not invited to subscribe. There has been a Gas Company in Lesmahagow since 1846.

On the recommendation of the Public Control Committee, the London County Council last Tuesday accepted the tender of Messrs. W. Sugg and Co., Limited, for the repair, reverification, and refixing of twelve gasholders at the Spitalfields gas-meter testing office.

The London County Council have decided to apply to Parliament for increased powers to deal with the smoke nuisance in London. One power sought is to spend a sum not exceeding £500 a year for the advancement of measures for the abatement of the smoke nuisance.

Mr. William Edgar, of Hammersmith, has been entrusted by the Hawera Gas Company, New Zealand, to fit up the town with the all-copper "Caxton" lantern, column cock, cast-brass street-lighting burner, and governor and distant lighters. These were all shipped quite a fortnight before the time specified.

At their meeting last Tuesday, the Directors of the Continental Union Gas Company, Limited, resolved to pay, on the 3rd prox., an interim dividend on the ordinary stock of 2½ per cent., free of tax, for the half year (being at the rate of 5 per cent. per annum), together with the half-yearly dividend of 3½ per cent. on the preference stock—the latter less income-tax.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GAS ENGINEER AND MANAGER. Bolton Gas Department. Applications by June 14.
MANAGER. Maryport Urban District Council. Applications by June 3.
DISTRICT SUPERINTENDENT. No. 5097. Applications by June 12.
WORKS CHEMIST. Preston Gas Company. Applications by June 14.
INSPECTOR, &c. No. 5100.
TRAVELLER. No. 5101.
SALESMAN. Canterbury Gas and Water Company. Applications by June 12.

Situations Wanted.

CLERK. No. 5099.
SECRETARY, MANAGER, OR ACCOUNTANT. W. B. Mimmack, St. Paul's Cray.

Plant, &c. (Second-Hand), for Sale.

COMPLETE GAS-WORKS. Northleach Gas Company, Gas-Cookers. Coventry Gas Department.
PURIFIERS, &c. Sutton Gas Company.

Plant, &c. (Second-Hand), Wanted.

LIVESEY WASHER. No. 5098.

Meeting.

INSTITUTION OF GAS ENGINEERS. Institution of Mechanical Engineers, Storey's Gate, S.W. June 15, 16, and 17.

Stocks and Shares.

PORTSMOUTH WATER COMPANY. June 15.
READING GAS COMPANY. June 14.
SOUTHEND WATER COMPANY. June 9.
WOKING ELECTRIC SUPPLY COMPANY. June 9.
YARMOUTH WATER COMPANY. June 9.

TENDERS FOR

Acid (Brimstone and Pyrites).

CHORLEY GAS DEPARTMENT. Tenders by June 15.

Coal and Cannel.

BARROW-IN-FURNESS CORPORATION. Tenders by June 8.
BURY CORPORATION. Tenders by June 14.
DEWSBURY GAS DEPARTMENT. Tenders by June 9.
GLOSSOP GAS COMPANY. Tenders by June 12.
HAVERHILL URBAN DISTRICT COUNCIL. Tenders by June 8.
LEEK GAS DEPARTMENT. Tenders by June 5.
LURGAN GAS COMPANY. Tenders by June 7.
NEWCASTLE-UNDER-LYME GAS DEPARTMENT. Tenders by June 14.
NEW MILLS URBAN DISTRICT COUNCIL. Tenders by June 12.
NORTHWICH GAS COMPANY. Tenders by June 10.
PETERBOROUGH GAS COMPANY. Tenders by June 7.
SALISBURY GAS COMPANY. Tenders by June 12.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 10.

Furnace Slag, Fettling, Mill Scale, Tarpaulin Cuttings, &c.

GREAT WESTERN RAILWAY. Tenders by June 8.

Lamps.

ROCHDALE GAS DEPARTMENT. Tenders by June 9.

Lime.

LOUGHBOROUGH GAS DEPARTMENT. Tenders by June 30.

Oil for Gas Manufacture.

BARROW-IN-FURNESS CORPORATION. Tenders by June 8.

Retort Setting and Rebuilding, &c.

MOUNTAIN ASH URBAN DISTRICT COUNCIL. Tenders by June 8.

Tar and Liquor.

ACCRINGTON GAS AND WATER BOARD. Tenders by by June 8.
BIRKENHEAD CORPORATION. Tenders by June 10.
CHORLEY GAS DEPARTMENT. Tenders by June 15.
DUDLEY GAS COMPANY. Tenders by June 8.
GREAT WESTERN RAILWAY. Tenders by June 8.
LEEK GAS DEPARTMENT. Tenders by June 5.
LOUGHBOROUGH GAS DEPARTMENT. Tenders by June 12.
MACCLESFIELD GAS DEPARTMENT. Tenders by June 12.
NEWCASTLE-UNDER-LYME GAS DEPARTMENT. Tenders by June 14.
STOURBRIDGE GAS DEPARTMENT. Tenders by June 11.

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COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

GEO. NEWTON, Limited, Wires: "AUTOMATIC, MANCHESTER." 40 YEARS' REPUTATION. WET, DRY, ORDINARY and PREPAYMENT, STATION METERS, &c. Late of Oldham—Note *new* Address:— 39, RIVER STREET HULME, MANCHESTER.

BENZOL AND CARBURINE FOR GAS ENRICHING. ALSO **THE MAXIM PATENT CARBURETTOR.** For Prices, &c., apply to THE GAS LIGHTING IMPROVEMENT CO., LTD., 7, BISHOPSGATE STREET WITHOUT, LONDON, E.C. Telegraphic Address: "Carburine, London."

APPLY TO THE **CHAIN BELT ENGINEERING CO.** DERBY, ENGLAND, FOR REALLY HIGH-CLASS **ELEVATORS AND CONVEYORS** ALSO **DRIVING AND CONVEYOR CHAINS.**

BROTHERTON & CO., LIMITED. Offices: City Chambers, LEEDS. Correspondence invited.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

TAR WANTED. National Telephone 7002. Telegrams: "UPRIGHT." Apply, THOMAS HORROCKS Albert Chemical Works, BRADFORD, MANCHESTER. Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

R. & G. HISLOP, GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c. RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING. UNDERWOOD HOUSE, PAISLEY.

ROBERT B. FITZMAURICE, 4, EAST INDIA AVENUE, LEADENHALL STREET, LONDON. Telegraphic Address: "FITZMAURICE, LONDON." Telephone: No. 11,113 CENTRAL. Established 1887. Advertiser, who is Shipping Agent to several Gas Companies, Municipalities, and Gas Material Makers, would be glad to undertake SHIPMENT OF GOODS ordered by Colonial Gas-Works or Others.

AMMONIACAL Liquor wanted. BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

SULPHURIC ACID. **SPECIALLY prepared for Sulphate of AMMONIA Makers by CHANCE AND HUNT, LIMITED,** Works: OLDBURY, WEDNESBURY, AND STAFFORD. Address Correspondence and Inquiries to OLDBURY, WORCS. Telegrams: "CHEMICALS, OLDBURY."

KINGS Patent Agency, Limited, 165, Queen Victoria Street, London, E.C. Director Benj. T. King, A.I.M.E., British Chartered Patent Agent (Regd. by Exam.). Telep. 682 Central. Teleg. "Geologic," London. We sustain over quarter of a century's Experience and Reputation for Patenting Inventions and Registering Trade Marks throughout the World. Write or call. We attend and advise you free.

GAS TAR wanted, BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

FIDDES-ALDRIDGE **SIMULTANEOUS Discharging-Charger.** The one Machine which Discharges and Charges at One Stroke. See Advertisement, May 4, p. II. of Centre. ALDRIDGE AND RANKEN, 39, VICTORIA STREET, WESTMINSTER, S.W. Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

KRAMERS AND AARTS WATER-GAS PLANT. K. & A. WATER-GAS COMPANY, LTD. 39, VICTORIA STREET, S.W.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants. We guarantee promptness, with efficiency for Repairs. JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON. Telegrams: SATURATORS, BOLTON. Telephone 0848.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services. It is also used for the enrichment of Gas. Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE. Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

D. ANDERSON AND COMPANY, GAS LIGHTING ENGINEERS AND CONTRACTORS, 18 & 20, FARRINGDON ROAD, LONDON, E.C. Telegrams: "DAYLIGHT LONDON." Telephone: 2336 HOLBORN.

HYDRATED OXIDE OF IRON. **PREPARED from Pure Iron.** Twice as Rich as Bog Ore. Gives no back Pressure. The Cheapest in the Market. READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

DESSAU PATENT VERTICAL RETORTS. **FOR list of Installations, see "Journal,"** May 18, p. I. of Centre. THE DESSAU VERTICAL RETORT COMPANY, Care of Mr. CHARLES HUNT, Consulting Engineer, 17, Victoria Street, WESTMINSTER, S.W.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d. MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX. See illustrated advertisement, May 11, p. I. of Centre. PINCHBECK LIMITED, Adams Place, George's Road, HOLLOWAY, N.

LUX'S GAS PURIFYING MASS. See Advertisement on p. 606. FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought. J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

AMMONIACAL Liquor wanted. CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS. Telegrams: "CHEMICALS."

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere. FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

BRISTOL RECORDING GAUGES AND THERMOMETERS. J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 25, BRIDGE END, LEEDS.

AMMONIA. Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

METER INDICES WITH AND WITHOUT DIALS. **A. ROUX & CO., Limited,** 9, SOUTHAMPTON STREET, HOLBORN, W.C. MOVEMENTS FOR CLOCKS, PHOTOMETERS AND BAROGRAPHS, WHEELS, PINIONS AND WORMS. WORKS, HANDSWORTH, BIRMINGHAM.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices. St. Paul's Cray, KENT.

CLERK, who has had Four Years' Ex-perience in the Office of a large Gas Company, wishes to obtain a SIMILAR POSITION. Good Writer. Disengaged, June 12. Address No. 5099, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Engineers attending the Meetings of the Institution of Gas Engineers are cordially INVITED TO VISIT us at 49, 50, and 51, Wool Exchange, Coleman Street, E.C. We can show you the TWIN-LIGHT BURNER, which, on low pressure, puts up Lighting Values at least 50 per Cent. This is no idle boast.

ONE of the largest Gas-Stove Firms requires a thoroughly Smart and up-to-date TRAVELLER for London and the South of England. Apply, in the first instance, giving all Particulars as to Age, Experience, Salary required, &c., to No. 5101, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Preston Gas Company require the Services of a Young WORKS CHEMIST. Salary, £80 per Annum. Applications, with *copies* of Testimonials, to be received by the undersigned not later than June 14. SAMUEL TAGG, Engineer.

WANTED—An Inspector to Visit Customers and obtain Orders for the Supply of Gas and Gas Appliances. Must be Conversant with the Relative Values of Gas and Electric Light.

Apply, by letter, stating Age, Experience, Salary required, and with *copies* of recent Testimonials, to No. 5100, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a District Superintendent for Control of Out-Door Staff (Gas and Water). Thoroughly up to date in Modern Lighting and able to Secure Business in Competition with Electricity. Good Appearance, Tactful, and Enterprising. Age not to exceed 35.

Applications, by letter, with at least Three recent *copies* of Testimonials, stating Wages, and if Married or Single, to be received by June 12, 1909.

Address No. 5097, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CANTERBURY GAS AND WATER COMPANY.

THE Directors require an Experienced Gas-Stove and Fittings Show-Room SALESMAN.

Applicants must be competent to Advise Consumers as to the use of Gas Cookers, Fires, Gas-Fittings, &c. Previous Experience and Knowledge of Gas Fitting and Electric Lighting essential.

Preference given to an Energetic Man of Good Address.

Salary, £100 per Annum, with House, Gas, and Water Free.

Applications, endorsed "Salesman," stating Age and Qualifications, with *copies* of Two recent Testimonials, in own Hand-Writing, to be delivered at the Company's Offices, Castle Street, Canterbury, on or before the 12th of June next.

JAMES BURCH.
Secretary.

Canterbury, May 26, 1909.

MARYPORT URBAN DISTRICT.

APPOINTMENT OF MANAGER OF GAS-WORKS.

THE Maryport Urban District Council invite APPLICATIONS for the above APPOINTMENT from competent Men thoroughly Acquainted with the Manufacture and Distribution of Gas and the Making of Sulphate of Ammonia. Preference given to a Practical Gasmaker.

Particulars of Duties may be had on Application to the undersigned.

Salary, £100 per Annum, with free House, Coal, and Lighting.

The person appointed will be required to give his whole time to the Service of the Council.

Canvassing, either directly or indirectly, will disqualify Applicants.

Applications, in Candidates' own Handwriting, stating Age, giving Particulars of Experience, and with Testimonials (not more than Three) of recent date, will be received by the undersigned up till Noon on Thursday, June 3 next.

F. KELLY,
Clerk of the Council.

Town Hall, Maryport,
May 21, 1909.

COUNTY BOROUGH OF BOLTON.

GAS ENGINEER AND MANAGER.

THE Gas and Lighting Committee of the Bolton Corporation invite APPLICATIONS for the APPOINTMENT of a GAS ENGINEER and MANAGER, who will be required to devote the whole of his time to the duties of the Office and will not be permitted to undertake any other Business Employment.

Salary, £500 per Annum, rising by Annual Increments of £25 to £600 per Annum.

Two Works—Make of Gas, 1000 Million Cubic Feet per Annum or thereabouts. Mechanical Stoking Machinery in use at One of the Works, and Generative Furnaces in use at both Works.

Applicants must have had Practical Experience in the Position of a Gas Engineer and Manager, and be thoroughly versed in the Manufacture and Purification of Coal Gas, both with Lime and Oxide of Iron, with the Construction of Water-Gas Plant and the Manufacture and Purification of Water Gas, and with the Manufacture of Sulphate of Ammonia, and also must have a thorough knowledge of the Commercial Management of a Gas-Works.

Applications, endorsed "Gas Engineer and Manager," stating Age and previous Experience, together with *copies* of not more than Three Testimonials of recent date (which will not be returned), to be delivered to the undersigned not later than Twelve Noon on the 14th of June next.

Canvassing Members of the Council will be deemed a disqualification.

SAMUEL PARKER,
Town Clerk.

Town Hall, Bolton,
May 21, 1909.

LIVESEY Washer Wanted, Modern make, 10-inch Connections, to effectively deal with 250,000 to 300,000 Cubic Feet per day.

State Price to No. 5098, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER has to Offer, for Im- mediate Delivery by Railway Trucks, in Large or Small Quantities, Fine Material from a large English Iron-Works, containing from 45 per cent. to 60 per cent. FERRIC OXIDE, and should be Useful for Gas Purification Purposes. Free Sample sent on Application.

Address No. 5102, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Three Purifiers, by Newton, Chambers, and Co., 20 ft. square by 5 ft. deep, Planed Joints, 18-inch Valves and Connections, with Bye-Passes, Travelling and Lifting Gear. In Good Condition. Being Removed for Extension.

Apply to the SECRETARY, Gas Office, Sutton, SURREY.

THE

Institution OF Gas Engineers.

THE

ANNUAL GENERAL MEETING

WILL BE HELD ON

TUESDAY, JUNE 15 (10.30 a.m.).
WEDNESDAY, JUNE 16 (10 a.m.),
AND
THURSDAY, JUNE 17 (10 a.m.),
AT THE
INSTITUTION OF MECHANICAL ENGINEERS,
STOREY'S GATE, ST. JAMES' PARK, WESTMINSTER,
By kind permission of the Council.

The Chair will be taken by the President,

THOMAS GLOVER, Esq.

In connection with the Meeting an Excursion to Norwich, will take place on the Friday, June 18.

Full Particulars are announced in the Programme.

THE BENEVOLENT FUND.

The Annual General Meeting of the Contributors to the Benevolent Fund will be held at the Institution of Mechanical Engineers on Wednesday, the 16th of June, at 10 a.m.

WALTER T. DUNN, Secretary.

39, *Victoria Street, Westminster, S.W.*,
May 24, 1909.

FOR SALE, Cheap, the undermentioned GAS PLANT:—

Kirkham's "STANDARD" WASHER-SCRUBBER to pass 250,000 cubic Feet per diem.
GASHOLDER, 3-Lift, 50 ft. dia., cap. 128,000 c.f.
EXHAUSTERS, 10,000 and 8000 cub. ft. per Hour.
4-inch Cast-Iron Vertical CONDENSER.
Wrought-Iron SCRUBBER, 9 ft. high by 3 ft.
Donkin's VALVES, 12-inch, 10-inch, 6-inch.

Apply to SAMUEL WHILE and SON, 60, Queen Victoria Street, LONDON, E.C.

TO CAPITALISTS AND OTHERS.

FOR SALE.

THE Directors of a Gas-Works in a Small Country Town, Seven Miles from Railway, are, owing to insufficient Capital, offering the BUSINESS FOR SALE. Output increased from Half-a-Million to Three Times that amount in Eighteen Months. Inspection and Offers invited.

Particulars from the SECRETARY, Gas Company, Northleach, GLOS.

THE Coventry Corporation Gas Depart- ment have FOR SALE about 170 WESTERN GAS-COOKERS, made by the Davis Gas Stove Company. These are excellent Gas-Cookers for Slot Consumers and are only offered for Sale because of being replaced by larger Cookers. They have been thoroughly Repaired, Cleaned, and Renovated, and supplied with New Grill Pans and Grids.

Price 12s. each, f.o.r. Coventry.

FLETCHER W. STEVENSON,
Engineer and General Manager.

Gas-Works, Coventry,
April, 1909.

WE have the following New and Over- hauled Second-Hand PLANT FOR SALE:—

GASHOLDER (Two-lift), 50 ft. by 18 ft., in BRICK or NEW STEEL TANK.
GASHOLDER (Two-lift), 50 ft. by 16 ft., in NEW STEEL TANK.
GASHOLDER (8500 cub. ft.), in NEW STEEL TANK (and smaller in stock).
Annular CONDENSERS, 8-in., 12-in., and 18-in. diameter Connections.
Water-Tube CONDENSERS (set of Three), 6-in. Connections.
Morris & Cutler CONDENSER, 8-in. Connections.
Pipe CONDENSERS, from 4 ins. up to 12 ins.
Clapham's WASHER-SCRUBBER, 6-in. Connections.
Tower SCRUBBERS, 7 ft. by 55 ft., 4 ft. by 16 ft., 3 ft. 6 ins. by 16 ft., &c.
EXHAUSTERS and ENGINES (Single and Combined) 2000 to 60,000 cub. ft.
PURIFIERS, 6 ft., 8 ft., 12 ft., and 20 ft. Squares. In sets of 2's or 4's.
STATION METERS, 4 in. to 18 ins., New Drums, Governors, 4 ins. to 10 ins.
TAR and LIQUOR PUMPS, for Hand Working and Steam Power.
BOILERS, TANKS, VALVES, and all Requisites for Gas-Works.

FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, Dewsbury, YORKS.

COAL.

THE Salisbury Gas and Coke Company invite TENDERS for 1000 to 3000 Tons of GAS COAL delivered f.o.r. Salisbury as required over next Twelve Months.

Tenders (on Sender's Form) before June 12, addressed to Mr. N. H. HUMPHRYS, Gas-Works, SALISBURY.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Purchase of their Surplus TAR during the Twelve Months ending June 30, 1910.

Tenders (on our own Tender Form), endorsed "Tar," and addressed to the Chairman of the Gas Committee, to be sent to me on or before Friday, June 11, 1909.

By order of the Committee,
CHARLES H. WEBB,
Engineer and Manager.

Gas-Works, Stourbridge,
May 27, 1909.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF GAS OIL.

THE Corporation are prepared to re- ceive TENDERS for the Supply of about 550 to 650 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas, delivered free at the Gas-Works Siding, in such quantities and at such times as may be required during the period ending June 30, 1910.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Oil," to be delivered at the Town Clerk's Office not later than Twelve o'clock Noon on Tuesday, the 8th of June, 1909.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to re- ceive TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the Supply of Screened GAS COAL and CANNEL for the Year ending the 30th of June, 1910.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office not later than Twelve o'clock Noon on Tuesday, the 8th of June, 1909.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

BOROUGH OF NEWCASTLE-UNDER-LYME.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply and Delivery of 9000 Tons of GAS FUEL during the Twelve Months ending June 30, 1910.

Forms of Tender may be had from the undersigned.

Tenders to be sent to the Town Clerk on or before June 14, 1909.

The Committee do not bind themselves to accept any Tender.

E. P. BASKEYFIELD,
Manager and Secretary.

Newcastle, Staffordshire,
May 22, 1909.

NEWCASTLE-UNDER-LYME CORPORATION.

(GAS DEPARTMENT.)

THE Gas Committee of this Corporation are prepared to receive TENDERS for the Purchase of their Surplus TAR and AMMONIACAL LIQUOR produced at these works for Twelve Months ending June 30, 1910.

Tenders, endorsed "Tar and Liquor," to be sent to the Town Clerk on or before June 14, 1909.

The Gas Committee do not bind themselves to accept the highest or any Tender.

The Tar and Liquor to be taken in Boats.

E. P. BASKEYFIELD,
Manager and Secretary.

Newcastle, Staffordshire,
May 22, 1909.

LOUGHBOROUGH CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Lough- borough Corporation invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months from July 1, 1909, to June 30, 1910.

Estimated amount of Tar, 600 Tons; Liquor, 1000 Tons.

The Contractor to state the Price for Liquor at 5° Twaddel, and per Ton extra for every ½° above 5°.

The Corporation to Deliver both Tar and Liquor into Contractor's Boats at the Derby Road Wharf, Loughborough.

Tenders, to be endorsed "Tenders for Tar and Liquor," and addressed and delivered to H. Perkins, Esq., Town Clerk, Town Hall, Loughborough, not later than Saturday, the 12th of June.

The Committee do not bind themselves to accept the highest or any Tender.

EDWARD ONIONS,
Engineer and Manager.

May 24, 1909.

LOUGHBOROUGH CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR LIME.

THE Gas Committee of the Lough- borough Corporation invite TENDERS for the Supply of 800 Tons (more or less) of Best Hand-Picked LIME for Purifying purposes, to be delivered at Loughborough Station during the Twelve Months ending June 30, 1910.

Further Particulars may be obtained from the undersigned.

EDWARD ONIONS,
Engineer and Manager.

May 24, 1909.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the Supply of approximately 12,000 Tons of GAS COAL.

Specification and Form of Tender may be obtained rom the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon on the 10th day of June, 1909, addressed to F. Geen, Esq., J.P., Chairman of the Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas Office, Stoke-on-Trent,
May 27, 1909.

HAVERHILL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Haverhill Urban District Council invite TENDERS for the Supply of 600, 1200, or 1800 Tons of best GAS COAL, Screened or Unscreened, to be delivered free at the Haverhill (Great Eastern Railway) Station in such Quantities and at such periods as may be ordered from time to time between the 1st day of July next and the 30th day of June, 1910.

No Form of Tender is provided, nor will be supplied.

The Council reserve the right to divide the Contract as they think fit, and do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed "Gas," to be delivered to me on or before the 8th day of June, 1909.

THOMAS BATES,
Clerk.

Haverhill, May 28, 1909.

BOROUGH OF CHORLEY.

(GAS DEPARTMENT.)

THE Chorley Corporation invite Tenders for the following for One or Two Years from the 1st of July, 1909—viz.:

1—Supply of BRIMSTONE ACID, 110 Tons or thereabouts per Annum.

2—Supply of PYRITES ACID, 200 Tons or thereabouts per Annum.

3—Purchase of the Surplus TAR for One Year. Approximate quantity, 650 Tons.

Forms of Tender for Acid and any further Information may be obtained from Mr. J. W. Allin, Gas Engineer, Chorley.

Tenders, duly endorsed, to be sent to me on or before Tuesday, the 15th day of June.

The Corporation do not bind themselves to accept any Tender.

JNO. MILLS,
Town Clerk.

Town Hall, Chorley,
May 28, 1909.

LURGAN GASLIGHT AND CHEMICAL COMPANY, LIMITED.

THE Directors invite Tenders for the Supply of 3500 Tons of Best Quality Screened GAS COAL, delivered into the Works at Lurgan, or placed on Lighters or on Rail at Belfast.

The Coal must be delivered in such Quantities and at such times as the Directors may fix, and the Weights as shown on the Company's Weighbridge to be accepted by the Contractor. Each Cargo to be accompanied by a Certificate as to place of origin.

Tenders (no Special Form in use), accompanied by Reference to Gas-Works using the Coal offered, should reach me not later than Monday, June 7, 1909, at 10.30 o'clock a.m.

The Directors do not bind themselves to accept the owest or any Tender.

FRED. W. MAGAHAN,
Secretary.

Gas-Works, Lurgan,
May 10, 1909.

BOROUGH OF MACCLESFIELD.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to re- ceive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months commencing the 1st day of July next.

Tenders, for the Tar or Liquor separately, to be sent in not later than Saturday, June 12, 1909, addressed to the "Chairman of the Gas Committee, Town Hall, Macclesfield," and endorsed "Tender for Tar, &c."

For Conditions, Apply to Mr. W. Newbigging, Engineer, Gas-Works, Macclesfield.

The Committee reserve to themselves the right of accepting any Tender for the Tar or the Liquor separately.

The highest or any Tender not necessarily accepted.

F. R. OLDFIELD,
Town Clerk.

May 19, 1909.

BOROUGH OF ROCHDALE.

(GAS DEPARTMENT.)

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the Supply of 100 16-inch Square STREET LANTERNS, suitable for Incandescent Lights. They must be Storm Proof, made of Copper throughout, and fitted with Porcelain Reflectors.

Persons Tendering must forward Sample Lantern, unpainted, addressed to Mr. T. Banbury Ball, the Manager, at the Gas-Works, Rochdale, from whom any further Information may be obtained.

Tenders, endorsed "Street Lanterns," containing detailed Description of the Lanterns offered, must be sent in to me, addressed to the Chairman of the Gas and Electricity Committee, not later than Noon on Wednesday, June 9, 1909.

By order,
WM. HENRY HICKSON,
Town Clerk.

Town Hall, Rochdale,
May 28, 1909.

COUNTY BOROUGH OF BURY.

THE Corporation of Bury are prepared to receive TENDERS for the Supply of about—

40,000 Tons of GAS COAL.
900 Tons of BOILER SLACK.
400 Tons of BURGY.
800 Tons of HOUSE COAL.

Forms of Tender and Conditions may be obtained on Application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders to be delivered to the Town Clerk, Bury, not later than Nine a.m. on Monday, June 14, 1909.

GREAT WESTERN RAILWAY.

THE Directors of this Company are pre- pared to receive TENDERS for the Purchase of:—

GAS TAR and AMMONIACAL LIQUOR.
FURNACE SLAG, FETTLING, and MILL SCALE.
TARPAULIN CUTTINGS and SHEET TIES.

Forms of Tender (upon which alone Tenders will be received) may be obtained on Application to the undersigned, by whom Tenders, marked outside "Tender for Residuals," will be received up to Ten a.m. on Tuesday, the 8th of June.

The Directors do not bind themselves to accept the highest or any Tender.

G. K. MILLS,
Secretary.

Paddington Station, London,
May 24, 1909.

LEEK URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at the Gas-Works during the Twelve Months ending June 30, 1910.

Sealed Tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leek, not later than Saturday, June 5, 1909, endorsed "Tender for Tar or Liquor," as the case may be.

Full Particulars, with Form of Tender, to be obtained from the undersigned.

By order,
HAROLD HENSHAW,
Clerk to the Council.

Town Hall, Leek,
May 20, 1909.

LEEK URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to re- ceive TENDERS for the Supply of 10,000 Tons of Screened GAS COAL or Washed or Unwashed NUTS, to be delivered at Leek Station in Quantities as directed for the period of Twelve Months ending June 30, 1910.

Forms of Tender to be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Gas Coal," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leek, not later than Saturday, June 5, 1909.

The lowest or any Tender will not necessarily be accepted; and the Committee reserve the right to Purchase the whole or any Portion of the Quantity offered.

By order,
HAROLD HENSHAW,
Clerk to the Council.

Town Hall, Leek,
May 20, 1909.

PETERBOROUGH GAS COMPANY.

TENDERS FOR BEST SILKSTONE GAS COAL.

THE Directors of the above Company invite TENDERS for One or Two Years' Supply of Best Screened SILKSTONE NUTS. Delivery to commence July 1, next.

The Tenders must state:—

Price per Ton in Waggons at Pit.
Railway Rate to Peterborough.
Waggon Hire to Peterborough.

Tenders must be sent in by the 7th of June, 1909, endorsed "Coal," and addressed to the Chairman of the Company, Gas-Works, Peterborough.

The Directors do not bind themselves to accept the lowest or any Tender.

Special Tender Forms are not provided.

JOHN BARTON,
Secretary and Manager.

Peterborough, May 21, 1909.

TO TAR DISTILLERS AND OTHERS.

THE Corporation of Birkenhead invite OFFERS for the Purchase and Removal of the Surplus TAR produced at their Gas-Works during a period of One, Two, or Three Years commencing July 1, 1909.

Deliveries will be made at the Gas-Works either into Contractor's Tanks on the Gas-Works Railway Siding or into Tanks for Conveyance by Water.

The Contractor whose Tender is accepted will be required to enter into a formal Contract or Agreement with the Corporation, upon the Specific Terms and Conditions contained in the Draft Contract which has been prepared by the Town Clerk and deposited in his Office for Inspection.

The Contract contains a Clause as to the payment of the Rate of Wages and the observance of the Hours of Labour recognized and agreed upon between the Trades Unions and the Employers in Birkenhead, or in the locality in which the work for carrying out the Contract is executed as the case may be.

Forms of Tender and further Particulars may be obtained from the Gas Engineer, Mr. T. O. Paterson, C.E., Gas-Works, Thomas Street.

Tenders, which must be on the printed form supplied, sealed and endorsed "Tender for Tar," to be sent in to me not later than Five p.m. on Thursday, June 10, 1909.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
J. FEARNLEY,
Town Clerk.

Town Hall, Birkenhead,
May 29, 1909.

NEW MILLS URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL, &c.

THE New Mills Urban District Council invite TENDERS for the Supply of 3000 Tons of Best GAS COAL and 500 Tons of CANNEL for the Year ending June 30, 1910.

Forms of Tender and full Particulars may be had on Application to the Gas Manager.

Tenders, properly endorsed, to be sent to me, the undersigned, not later than June 12, 1909.

The Council do not bind themselves to accept the lowest or any Tender.

J. POLLITT,
Clerk.

Town Hall, New Mills,
May 24, 1909.

TENDERS FOR SURPLUS TAR.

THE Directors of the Town of Dudley Gaslight Company invite TENDERS for the Surplus TAR produced at their Works during the Year ending June 30, 1910. The Tar to be loaded into Buyer's Tank at the Gas-Works.

Further Information may be obtained at the Works.

Sealed Tenders, addressed to the Chairman and endorsed "Tender for Surplus Tar," to be sent in not later than the 8th prox.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
T. E. STILLARD,
Secretary.

Gas-Works, Dudley,
May 26, 1909.

THE Directors of the Glossop Gas Company invite TENDERS for the Supply, during the Year commencing Aug. 1, 1909, of about 6000 Tons of Good GAS COAL and 500 Tons of CANNEL, which must be delivered, carriage paid, at the Great Central Railway Station, Glossop.

Forms of Tender may be obtained at the Company's Office.

Sealed Tenders, specifying the Description of the Coals and the Pit from which they are to be raised, must be sent to the Chairman of the Company not later than Saturday, the 12th of June next.

The Directors do not bind themselves to accept the lowest or any Tender.

J. SIDEBOTTOM,
Secretary.

Gas Offices, Glossop,
May 24, 1909.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

THIS Board invite Tenders for the Surplus TAR and AMMONIACAL LIQUOR which may be produced at the Accrington and Great Harwood Works of the Board during the Year from the 1st of July next to the 30th of June, 1910.

The estimated quantity of Tar is 2000 Tons; and Liquor, 6000 Tons.

Sealed Tenders, endorsed "Tar and Liquor," addressed to the Chairman of the Board, must be in my hands on or before Tuesday, the 8th of June.

By order,
CHARLES HARRISON,
General Manager.

General Offices, Accrington,
May 26, 1909.

BOROUGH OF DEWSBURY.

THE Gas Committee are prepared to re- ceive TENDERS for the Supply and Delivery at their Gas-Works Siding, Savile Town, Dewsbury, of the following Quantities of Screened GAS COAL, during the period of One, Two, or Three Years commencing on the 1st day of July next:—

	Black Coal.	Cannel.
1st Year	22,000 Tons.	1000 Tons.
2nd Year	22,000 ,,	2000 ,,
3rd Year	22,000 ,,	2000 ,,

Tenders must specify Prices for Delivery by Rail, and be made on Forms to be had on Application to Mr. George Wm. Fligg, Savile Town Gas-Works, Dewsbury, from whom any further Information can be obtained.

Sealed Tenders, endorsed "Tender for Gas Coal," to be sent to me, not later than Wednesday, the 9th day of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

H. ELLIS,
Town Clerk.

Town Hall, Dewsbury,
May, 1909.

MOUNTAIN ASH URBAN DISTRICT COUNCIL.

TO GAS-PLANT CONTRACTORS.

THE Council invite Tenders for Sup- plying and Delivering to the Penrhiwceiber Gas-Works the necessary MATERIALS, and Executing the LABOUR in RE-SETTING from Foundations Two (2) REGENERATIVE SETTINGS of Six (6) RETORTS, and RE-BUILDING One (1) Bed of Six (6) RETORTS from floor level, in existing Empty Arches.

The Council will provide the Retorts and all Ironwork except Retort Bolts.

Further Particulars required may be obtained from Mr. W. G. Thomas, Surveyor, Town Hall, Mountain Ash, on and after Thursday, the 27th inst.

The Council do not bind themselves to accept the lowest or any Tender.

Tenders, prepaid and endorsed "Gas-Works Renewals," to be sent to me so that they may be received not later than Ten a.m. on Tuesday, the 8th day of June, 1909.

By order,
H. P. LINTON,
Clerk to the Council.

TownsHall, Mountain Ash,
May 24, 1909.